G/E 3 L/O 4.5 F/W 1.8
H/O 4.2 S/W 1.05

JT 58, 57, 57, 57, 58, 61
EX 330 340 330 360 270 310

~~Fuel~~ ~~fm~~ ~~41~~
~~Dest~~

L/O IN 77 L/O out 71

Load 100

F/W cooler (2 nos) F/W IN 56 S/W IN
F/W out 44 S/W out 36

S/W PIR Temp: 28

L/O PIP pr: = 2.5

L/O filter Bef = 2.6
Aft = 2.4

L/O cooler (P) LH 44
out 37
S/W out 30

Piston inlet 40

JT - 93

Thrust bear - Boiler

Air receiver
1, 2
23, 21

F/W cooler (S) out F/W IN 56
F/W out 46 S/W out

Purifier temp 66

L/O cooler (S) IN 44
out 38
S/W out 30

42, 43, 40, 39, 40, 38, 37

DAIRY → +6

MEAT - −12

H/O DY TK P → 78

H/O DY TK S → 62

H/O SETT TK → 38

T/O BLR

F	A
Ex 325	Ex 220
TK 62	TK 58

Ex - 380, 345, 372, 385, 385, 383, 405

JK - 44, 54, 58, 59, 57 58, 56

(Fuel feeder- 42 43 40 39 40 39 37)

CYL TK → 65

Fuel lever 41.5

NOZZLE cooler IN → 54 OUT → 53

H/O DY TK P - 10

H/O DY TK S - 4.7

Turbo cooler - IN 54 SWIN 53

out 53 owt 54

Scav: Air 46, 38, 44

Air cooler F 61 A 64

SW SW 33

Ir27 (field control resistor) L817→18 — (battery ignition sensor)
Ir24 gen:- field s/c series resistor (221, 232)

Ir41 → L236, L237

La2 → L210 → L31 / L32

Jib ⇒ 2.32 v
cut = 50V. } Excitation

2r27 → L313, L314
3827 = L2 2 → L3 9
3m2 ngar L25,

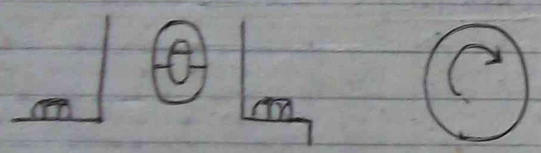
Bl:- 30, 36 2 Gr (Power point)

mv myoma Yara

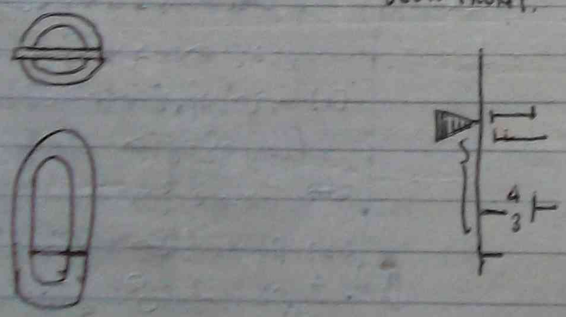
DIAYA Engine (GL6 1823)

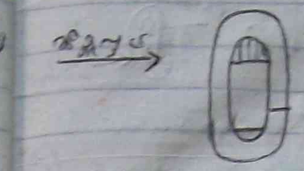
Firing order 1 4 2 ⑥ 3, 5

16, 3,4, 2,5
1 2 ③ 4 5 6

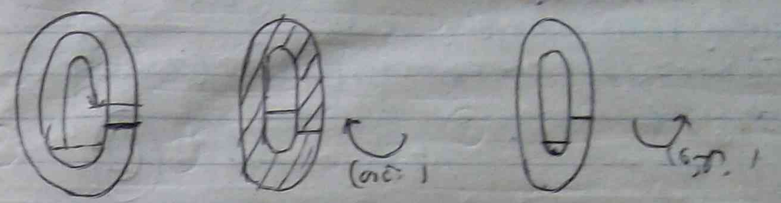


SEEN FRONT.



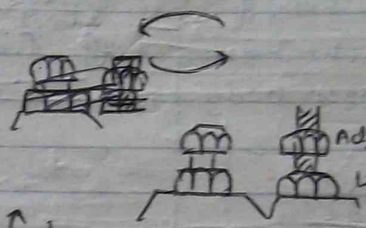


& fuel Timing ಫಿಕ್ಸ್ fuel lever ನ stop ಆಗೋಕೆ
ಒಂದ್ (drawing/system
line

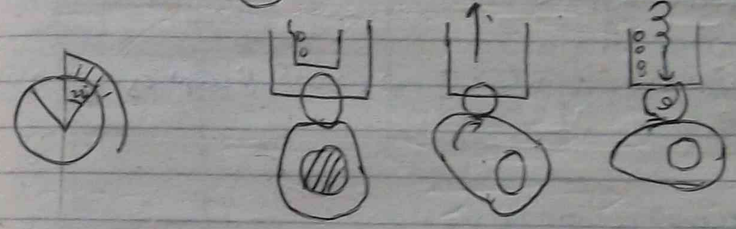


too Late

too early.
start injecting.



early = ↻
Late = ↺



ಫಿಟ್ ಮಾಡಿದ ನಂತರ ಅದನ್ನು ಚೆಕ್ ಮಾಡಬೇಕು

& personal safety (ಅಪಾಯದಲ್ಲಿ ಆದಾಗ ಕೆಲಸ ಮಾಡಿ ಅಂತ ಹೇಳಿ ಕೊಡಬೇಕು ಅಂತ ಅಲ್ಲ ಅಪಾಯದಲ್ಲಿ ಇದ್ದಾಗ ಕೆಲಸ ಮಾಡಬಾರದು ಅಂತ ಹೇಳಿ ಕೊಡಬೇಕು)

1/ Hair line system ಫಿಟ್ ಆಗಿರಬೇಕು
2/ Fuel lever ನ stop position ಚೆಕ್ ಮಾಡಬೇಕು
Stop position ಚೆಕ್ ಮಾಡೋಕೆ ಫಿಟ್ ಆದ fuel oil ಅನ್ನು ತೆಗೆದು ಹಾಕಬೇಕು, Fuel ಎಲ್ಲಾ cylinder ಗೆ ಹೋಗಿ ಆಗಿರಬೇಕು ಆಗ ಇಂಜಿನ್ fuel pump ನಲ್ಲಿ ಒತ್ತಡ ಇರುವುದಿಲ್ಲ
3/ ಫಿಟ್ Timing check ಮಾಡಿದ ನಂತರ power stroke ಚೆಕ್ ಮಾಡಿ, flywheel ಗೆ end of injection ಗುರುತು ಮಾಡಿ pointer ಫಿಟ್ ಆಗಿರುವ ಜಾಗದಲ್ಲಿ ಇರಬೇಕು ಆಗ assembly pump body ಯನ್ನು ಹಿಡಿದು ಅದರ plunger ಅನ್ನು ಹೊರಗೆ ಎಳೆಯಬೇಕು

Plunger
Body

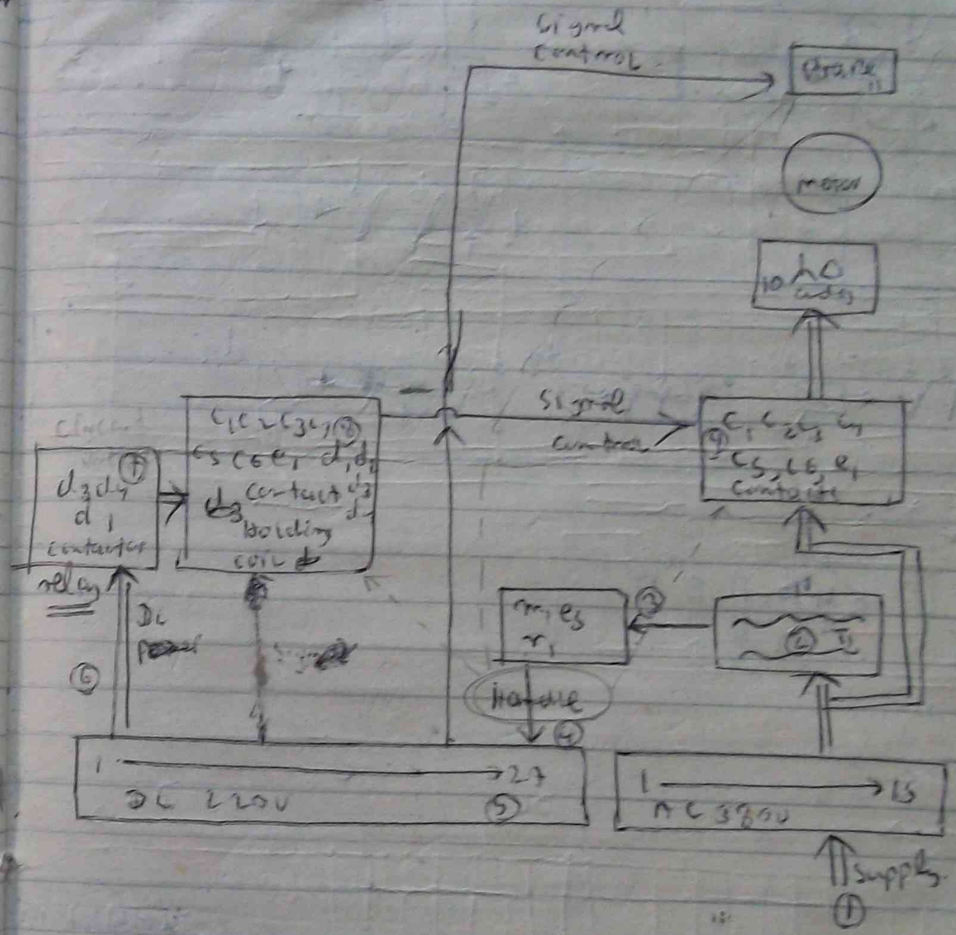
Plunger rotation (flywheel end of ignition) start of injection
(Too early injection timing)
Plunger rotation (flywheel end of ignition) (Too late ignition
(Timing

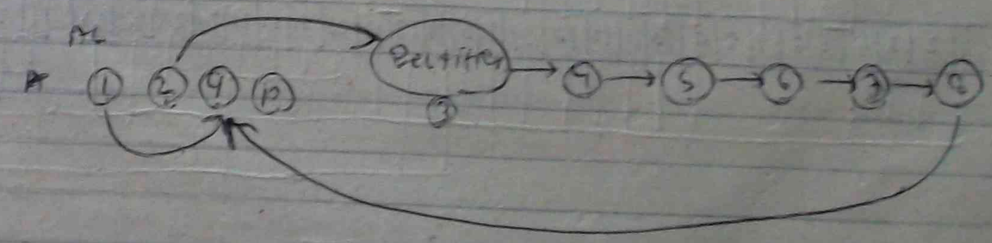
Timing

Delivery valve

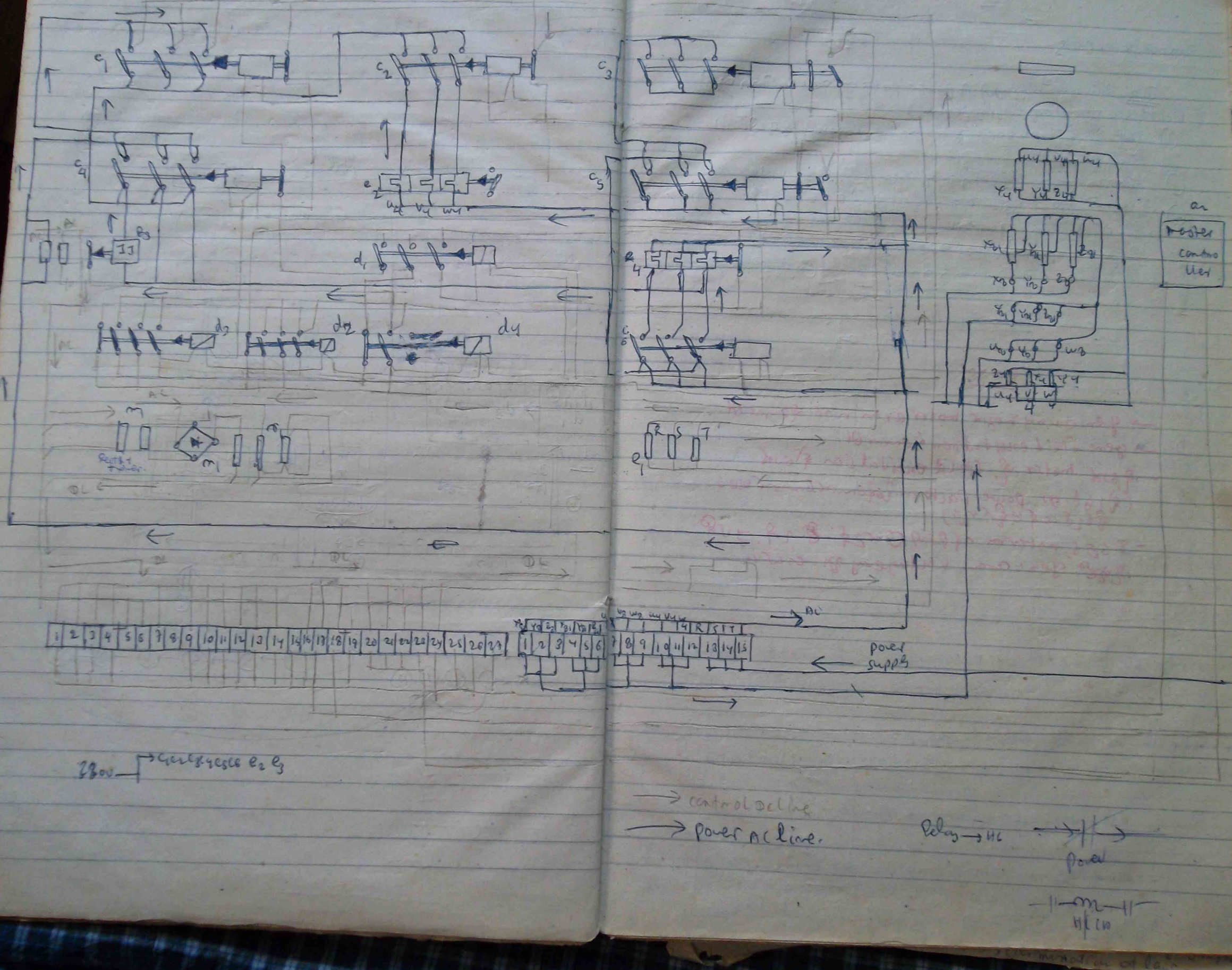
Fuel

Windlass motor control circuit





Windlass motor control circuit.



Runner power pack

Jib, Runner ಸ್ಟಾರ್ಟಿಂಗ್ ಗೆ power pack ಮೂಲಕ ಪವರ್ ಸಪ್ಲೈ
(Electronic single lap lifting device)

1. Ref. ಕೆಪಿಸಿ, amplifier ಸ್ಟೇಜ್ ನಲ್ಲಿ ಕೆಪಿಸಿ ಸಿಗ್ನಲ್ ಅನ್ನು ಕಳುಹಿಸಿ result ಪಡೆಯಲಾಗಿದೆ
2. ಸಿಗ್ನಲ್ control ಆಗಿರುವ ಬಗ್ಗೆ ಸಿಗ್ನಲ್ ಅನ್ನು ಕಳುಹಿಸಿ ಪರಿಶೀಲಿಸಲಾಗಿದೆ
3. ಕೆಪಿಸಿ ಮೂಲಕ ಕಳುಹಿಸಿದ ಸಿಗ್ನಲ್ ಅನ್ನು result ಪಡೆಯಲಾಗಿದೆ ಮತ್ತು ಅದನ್ನು ಪುನಃ checking ಪರಿಶೀಲಿಸಲಾಗಿದೆ
4. ಈ power pack ಅನ್ನು ಕೆಪಿಸಿ ಮೂಲಕ ಸಿಗ್ನಲ್ ಅನ್ನು ಕಳುಹಿಸಿ main ಪವರ್ ಅನ್ನು ಕಳುಹಿಸಿ ಪರಿಶೀಲಿಸಲಾಗಿದೆ.

Final Results

ಫಲಿತಾಂಶ

→ gen: army ನಲ್ಲಿ motor armature ಅನ್ನು ಪರಿಶೀಲಿಸಲಾಗಿದೆ
→ gen: field excitation ಪರಿಶೀಲಿಸಲಾಗಿದೆ
→ ಹಿಂದಿನ motor ನ field excitation ಬದಲಾಗಿದೆ
(ಪ್ರತಿಯೊಂದು power pack ಅನ್ನು ಪರಿಶೀಲಿಸಲಾಗಿದೆ ಮತ್ತು ಅದರ ಫಲಿತಾಂಶವನ್ನು ಕೆಳಗೆ ನೀಡಲಾಗಿದೆ)
- ಹಿಂದಿನ motor ನ field excitation ಬದಲಾಗಿದೆ. ಹೀಗಾಗಿ ಪ್ರತಿಯೊಂದು ಸ್ಟೇಜ್ gen: armature voltage ಬದಲಾಗಿದೆ

Transductor ಪರಿಶೀಲನೆ- Results

Power Pack

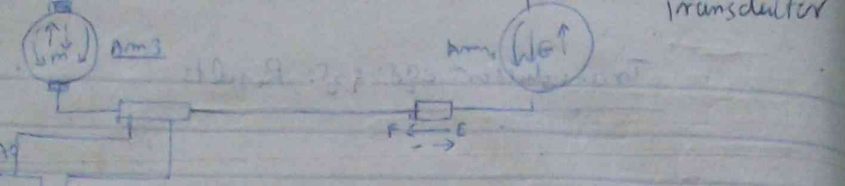
1. 3ϕ 230V 50Hz supply ಯನ್ನು L_3(11) L_3(13) ಜೋಡಿಸಿದ step/down Transformer rectifier ಪರಿಶೀಲಿಸಿದ DC bias voltage ಅನ್ನು ಪರಿಶೀಲಿಸಿದ power pack ನ Transistor ಗಳಿಗೆ ಕಳುಹಿಸಿ, Bias ಸಿಗುವಂತೆ ಮಾಡಲಾಗಿದೆ
2. 3ϕ motor ನ couple ಆಗಿರುವ gen: ನ armature current ಅನ್ನು motor ನ armature ಅನ್ನು ಕೆಪಿಸಿ, ಸಿಗ್ನಲ್ ಅನ್ನು ಕಳುಹಿಸಿ ಪರಿಶೀಲಿಸಿದ AH(4H4) (4H1) ಪರಿಶೀಲಿಸಿದ power pack ನ 21, 15/16 ಅನ್ನು ಪರಿಶೀಲಿಸಿದ ಪರಿಶೀಲಿಸಿದ / 91, 101 Bus ಗೆ ಜೋಡಿಸಿದ ಈ AC ಯನ್ನು rectifier ಮಾಡಿದ
3. ಕೆಪಿಸಿ ಪರಿಶೀಲಿಸಿದ ಈ Thyristor gate firing (ಸಿಗ್ನಲ್) ನ control signal ಅನ್ನು (3s) ಯನ್ನು ಕೆಪಿಸಿ
4. ಕೆಪಿಸಿ DC 220V charge voltage ಅನ್ನು ಈ ಸರ್ಕ್ಯೂಟ್ ಗೆ ಕಳುಹಿಸಿ, ಕೆಪಿಸಿ Loudour ಮೂಲಕ ಪರಿಶೀಲಿಸಿದ ಪರಿಶೀಲಿಸಿದ 34/36 ಮತ್ತು (91) (101) Bus ನ DC voltage ಅನ್ನು ಪರಿಶೀಲಿಸಿದ
5. ಕೆಪಿಸಿ (101, 91) Bus ನಲ್ಲಿ Brake coil ನ voltage ಅನ್ನು ನೋಡಲಾಗಿದೆ
6. 34/36 ನ್ನು (91) (101) ನ polarity ಪರಿಶೀಲಿಸಿದ power pack ನ change ಆಗಿದೆ ಮತ್ತು gen: armature ನ/motor armature ನಲ್ಲಿ one direction ನಲ್ಲಿ ಈ ಸರ್ಕ್ಯೂಟ್ ಅನ್ನು ಪರಿಶೀಲಿಸಿದ gen: field coil excite voltage ಬದಲಾಗಿದೆ- gen: one armature one direction armature ಅನ್ನು ಪರಿಶೀಲಿಸಿದ 2 direction ನಲ್ಲಿ motor armature ನ polarity change ಆಗಿದೆ ಪರಿಶೀಲಿಸಿದ ಮತ್ತು ಕೆಪಿಸಿ polarity change ಆಗಿದೆ ಪರಿಶೀಲಿಸಿದ motor field coil ನ polarity change ಆಗಿದೆ ಪರಿಶೀಲಿಸಿದ 2 direction motor ಪರಿಶೀಲಿಸಿದ
7. power pack ನ (13, 14) ಗೆ AC power ಕೊಟ್ಟಾಗ 2b, ನ ON ಆಗಿದೆ ಮತ್ತು 2b, ನ contactor ನ Holding coil ಅನ್ನು ಈ ಸರ್ಕ್ಯೂಟ್ ಆಗಿದೆ
8. 103, 106 ನ್ನು ಆನ್ ಮಾಡಿದ, contactor ನ ON ಆಗಿದೆ ಮತ್ತು, Jib, run/turn ಕೆಪಿಸಿ ಪರಿಶೀಲಿಸಿದ ಈ contactor ನ 2b1, 2b2, 2b4 ನ ON ಆಗಿದೆ ಮತ್ತು ಕೆಪಿಸಿ: 2b, 2b4 ನ Holding coil current ಅನ್ನು (4T2, 4T3) (13, 14) ನ controller ಗೆ ಕಳುಹಿಸಿದ
9. Generator field coil ನ J-U power ನ 2b, (A) 2b, (E) ಜೊತೆ change ಆಗಿದೆ: polarity voltage change ಆಗಿದೆ
10. ಕೆಪಿಸಿ 34, 36 ನ್ನು ಆನ್ ಮಾಡಿದ ಈ gen: ನ ಪರಿಶೀಲಿಸಿದ ಆಗಿ, ಆನ್ ಮಾಡಿದ ಈ Ref. ಅನ್ನು ಕೊಟ್ಟಾಗ Thyristor ಆನ್ ಆಗಿದೆ 34, 36 ಅನ್ನು ಈ ಪರಿಶೀಲಿಸಿದ AC ಯಿಂದ DC ಆಗಿ ಪರಿವರ್ತನೆ ಆಗಿದೆ. J12 ಸ್ಲಾಟ್ ನ Transistor ಈ bias ಆಗಿದೆ

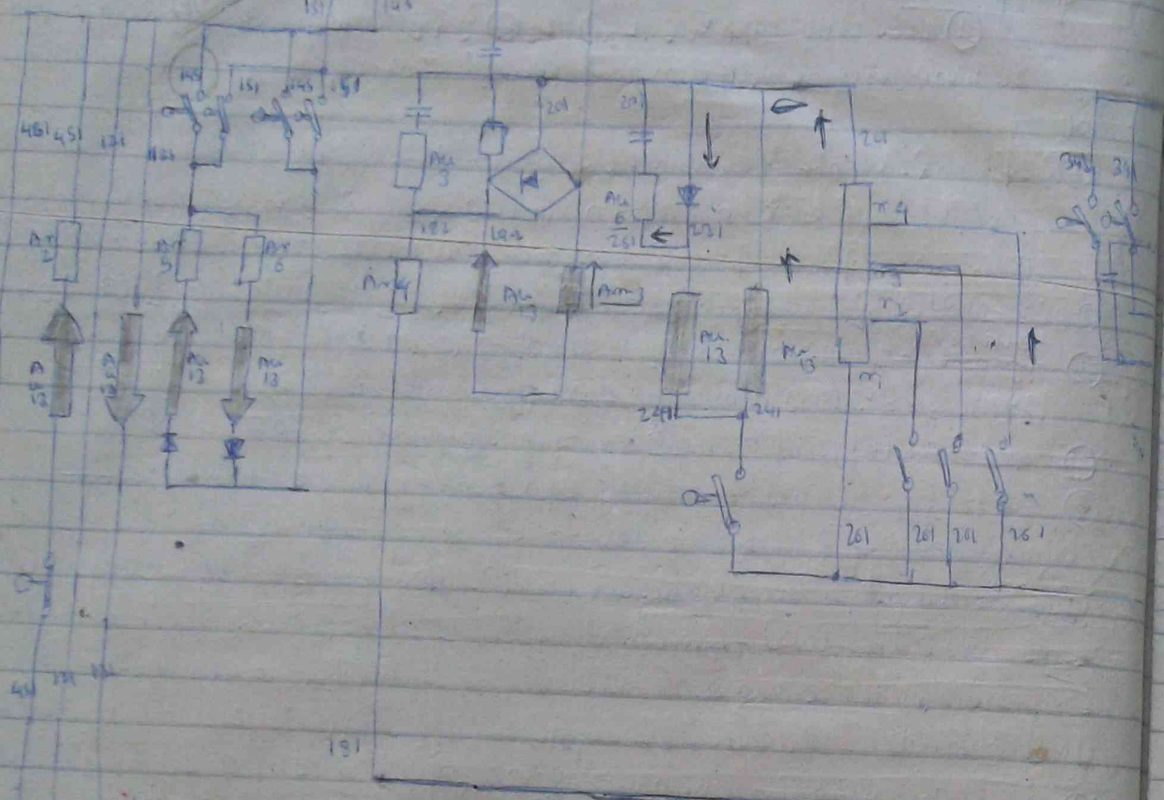
Thyristor ← speed control / on / off.

✳ ಮೇಲಿನ ಕೆಪಿಸಿ ಫಲಿತಾಂಶ ಈ ಪರಿಶೀಲಿಸಿದ gen: field coil ಅನ್ನು ಈ ಸರ್ಕ್ಯೂಟ್ (up/down) ಮಾಡಿದಾಗ ಪರಿಶೀಲಿಸಿದ gen: ನ generated voltage ಬದಲಾಗಿದೆ ಪರಿಶೀಲಿಸಿದ motor ಅನ್ನು ಪರಿಶೀಲಿಸಿದ ಕೆಪಿಸಿ $E_g = \frac{\phi ZN}{60} \times \frac{P}{a}$ / E_g = const.

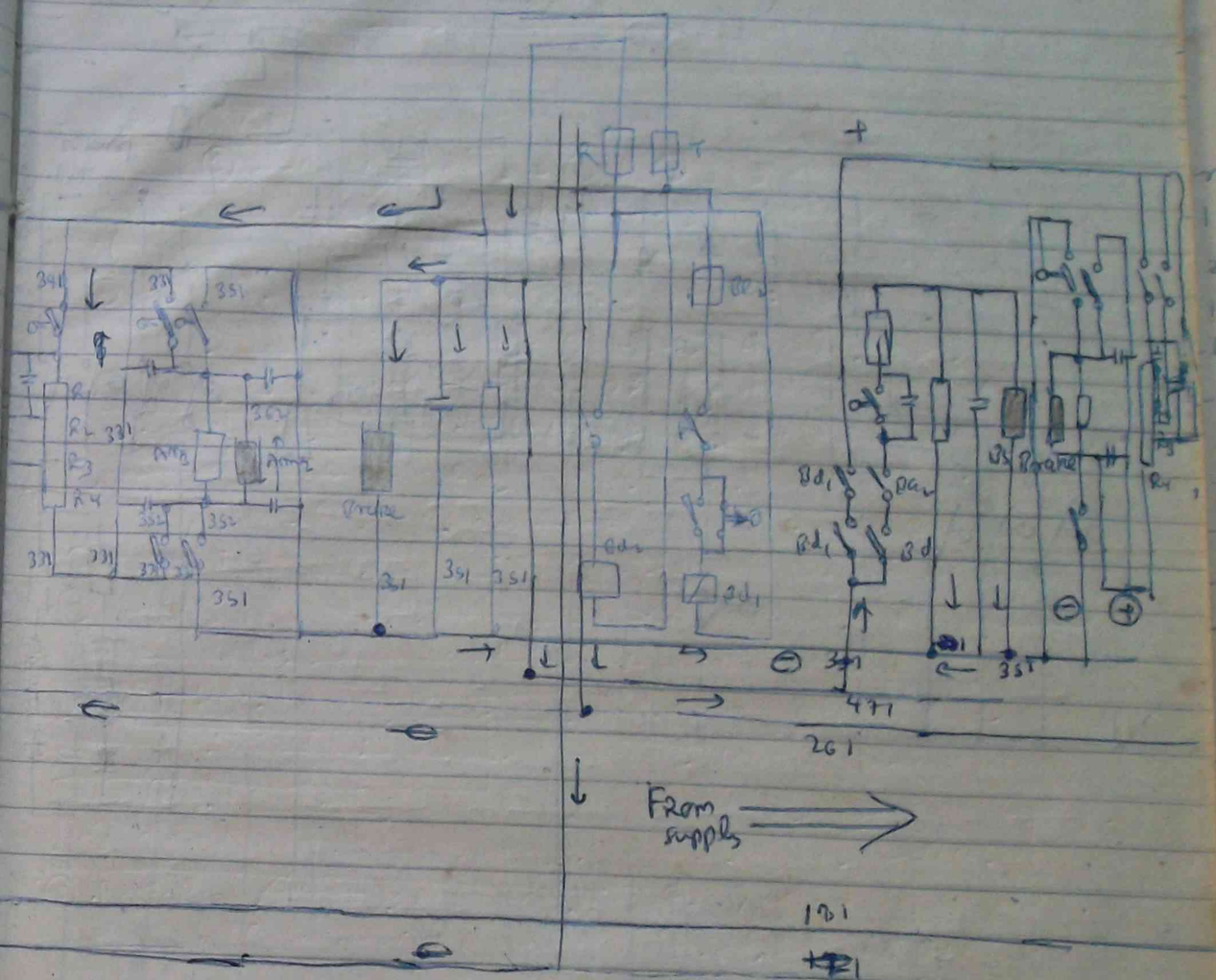
gen: ನ terminal ನಲ್ಲಿ ಕೆಪಿಸಿ ಸಿಗುವಂತೆ motor terminal ಅನ್ನು ಪರಿಶೀಲಿಸಿದ ⟹ $E_g = V_t + I_a R_L$ / motor ಗೆ power load ಕೊಟ್ಟಾಗ (Ia) ಹೆಚ್ಚಾಗಿದೆ ∴ V_t ನ value ಕಡಿಮೆ ಆಗಿದೆ

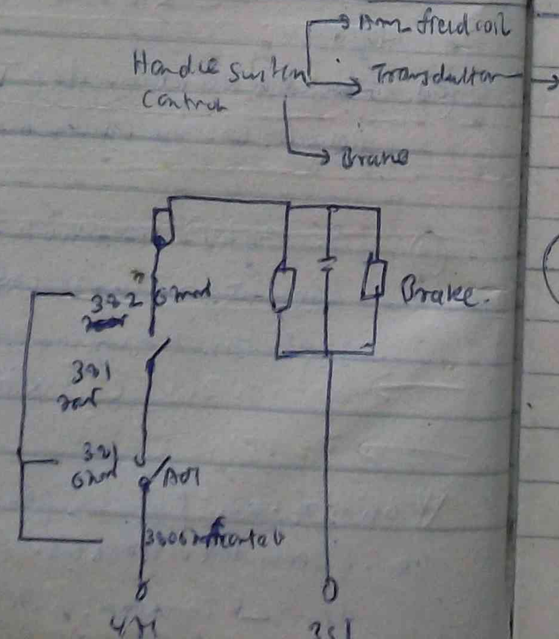
Transductor

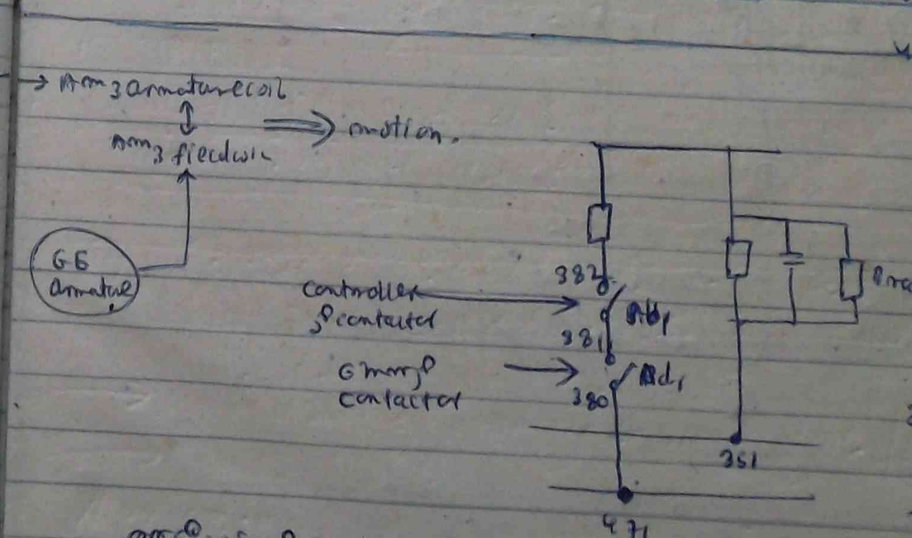




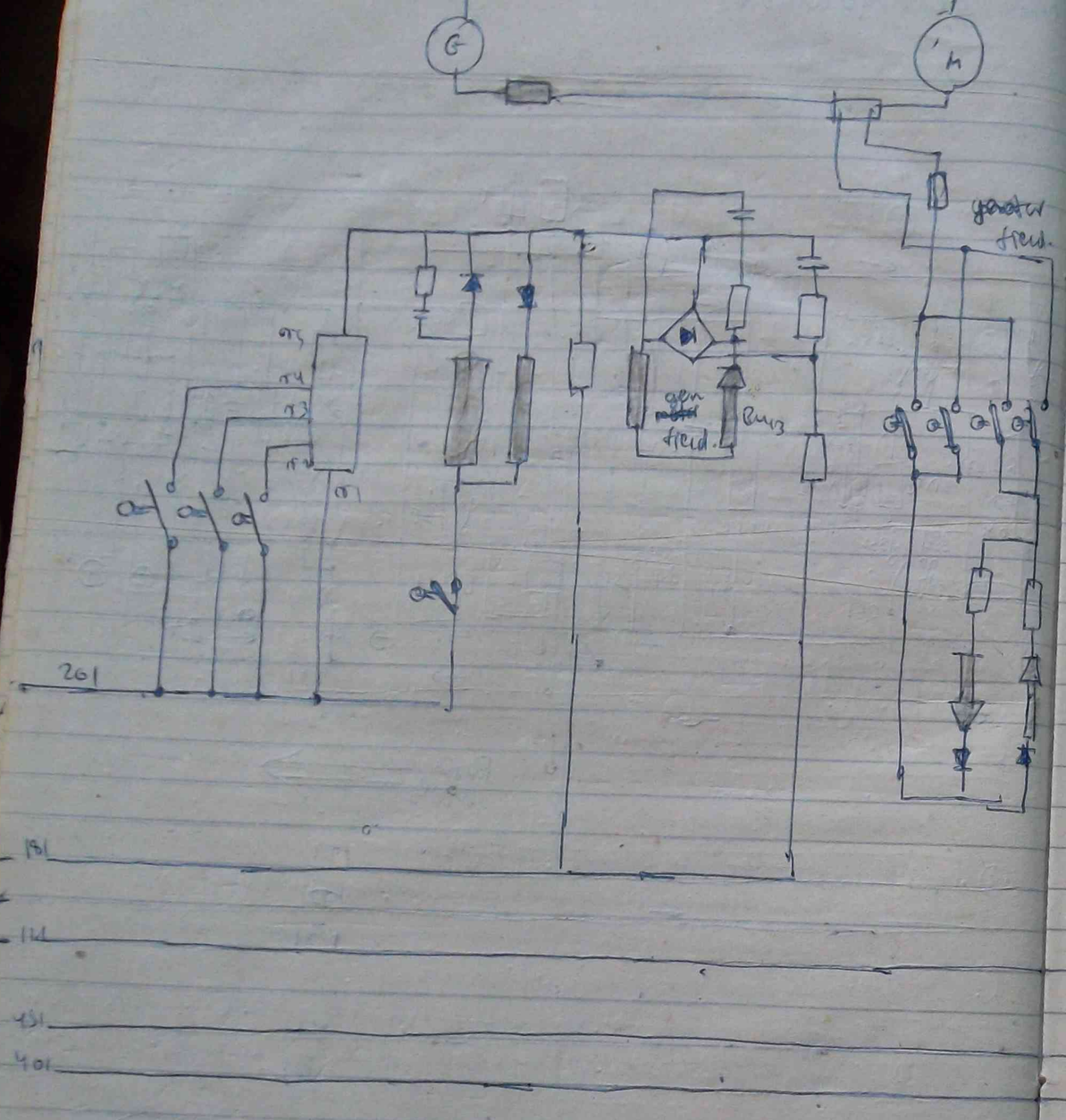
method DC cargo winches

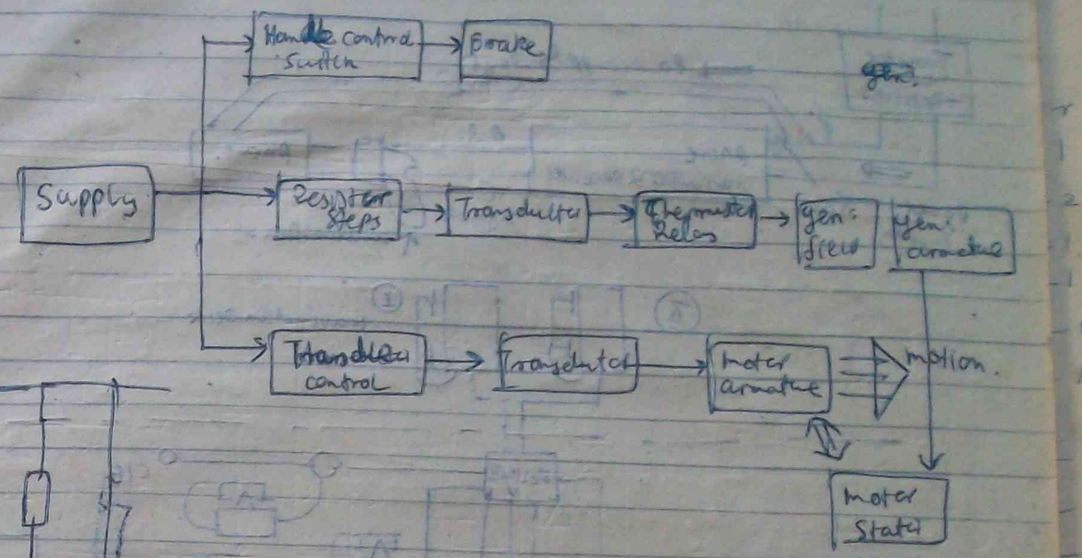


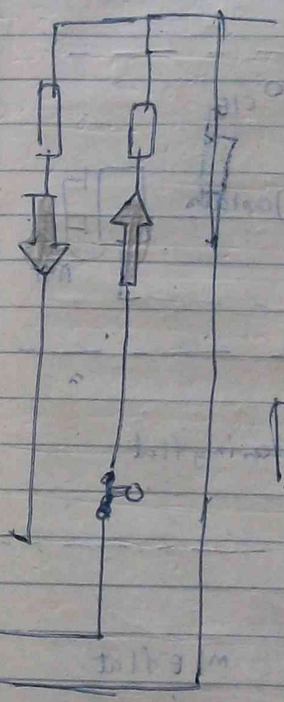


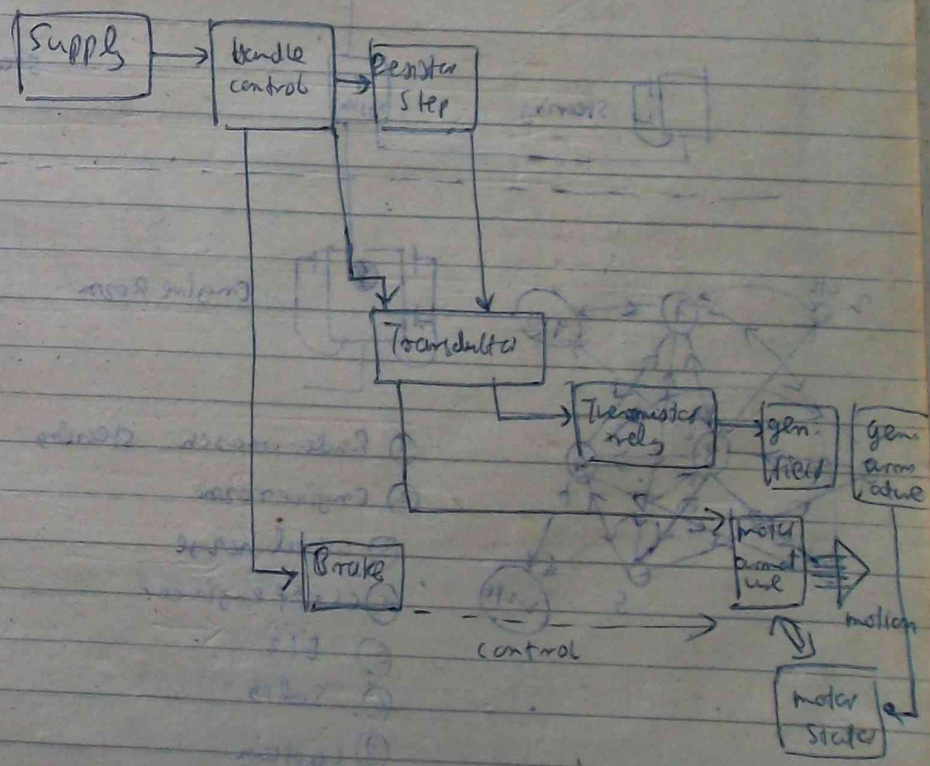


351 & 471 ಪಥದ ಮೇಲೆ ಇರುವ brake system ನಿಯಂತ್ರಣ system ಅನ್ನು ತೋರಿಸುವ general layout plan ಇದಾಗಿದೆ. ಇದರಲ್ಲಿ mast house ನ barge ನಲ್ಲಿ ಇರುವ 471 ಮತ್ತು 351 ಪಥಗಳ ಮೇಲೆ ಇರುವ 380 ಮತ್ತು 381 ಸಂಪರ್ಕಕಗಳನ್ನು ತೋರಿಸಲಾಗಿದೆ. 332 ಪಥದ ಮೇಲೆ ಇರುವ

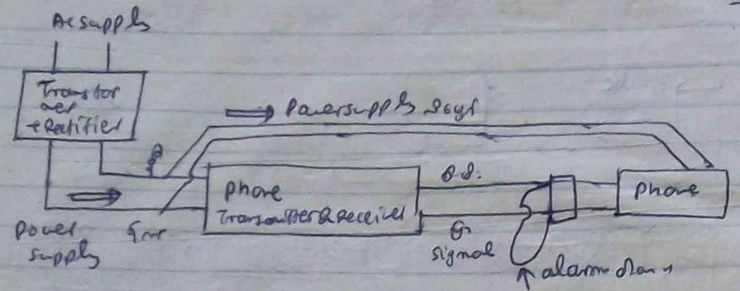

G
M
generator field
gen motor field
Bus3
261
151
141
451
401

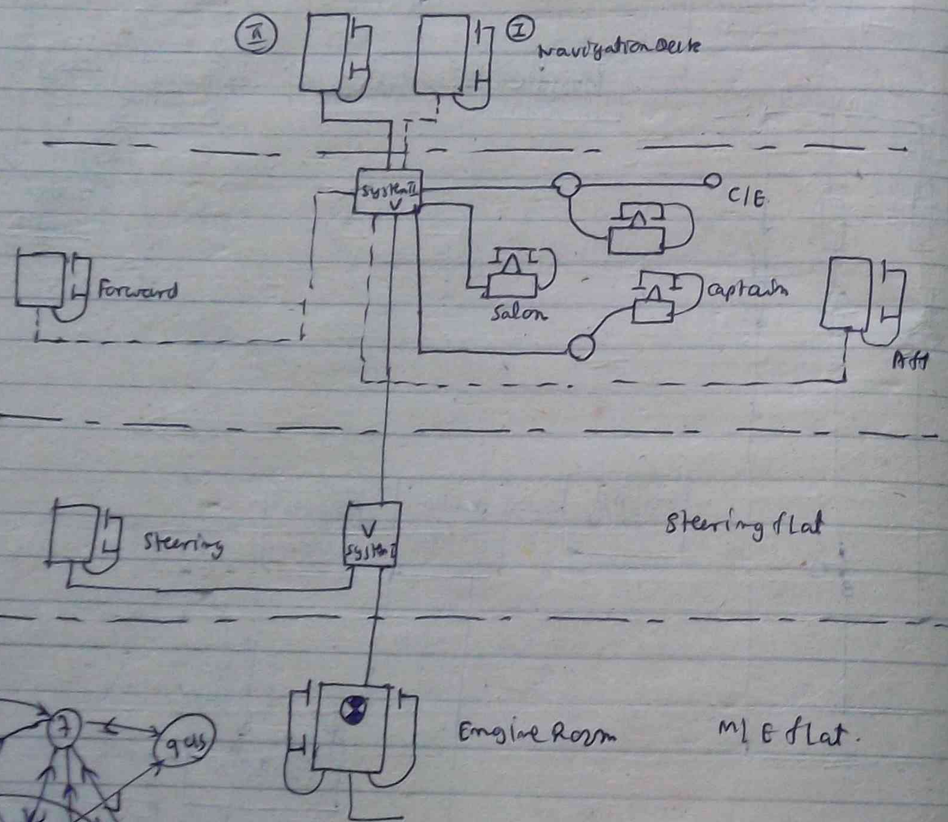

Handle control switch
Brake
Supply
Resistor steps
Transductor
Thermistor Relay
gen: field
gen: armature
Transductor control
Transductor
motor armature
motion.
motor stator

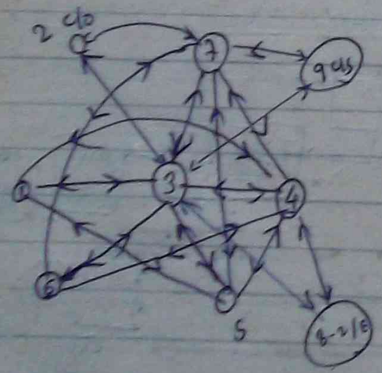



Supply
handle control
Resistor Step
Transductor
Thermistor rely
gen. field
gen. armature
Brake
motor armature
motion
control
motor stator

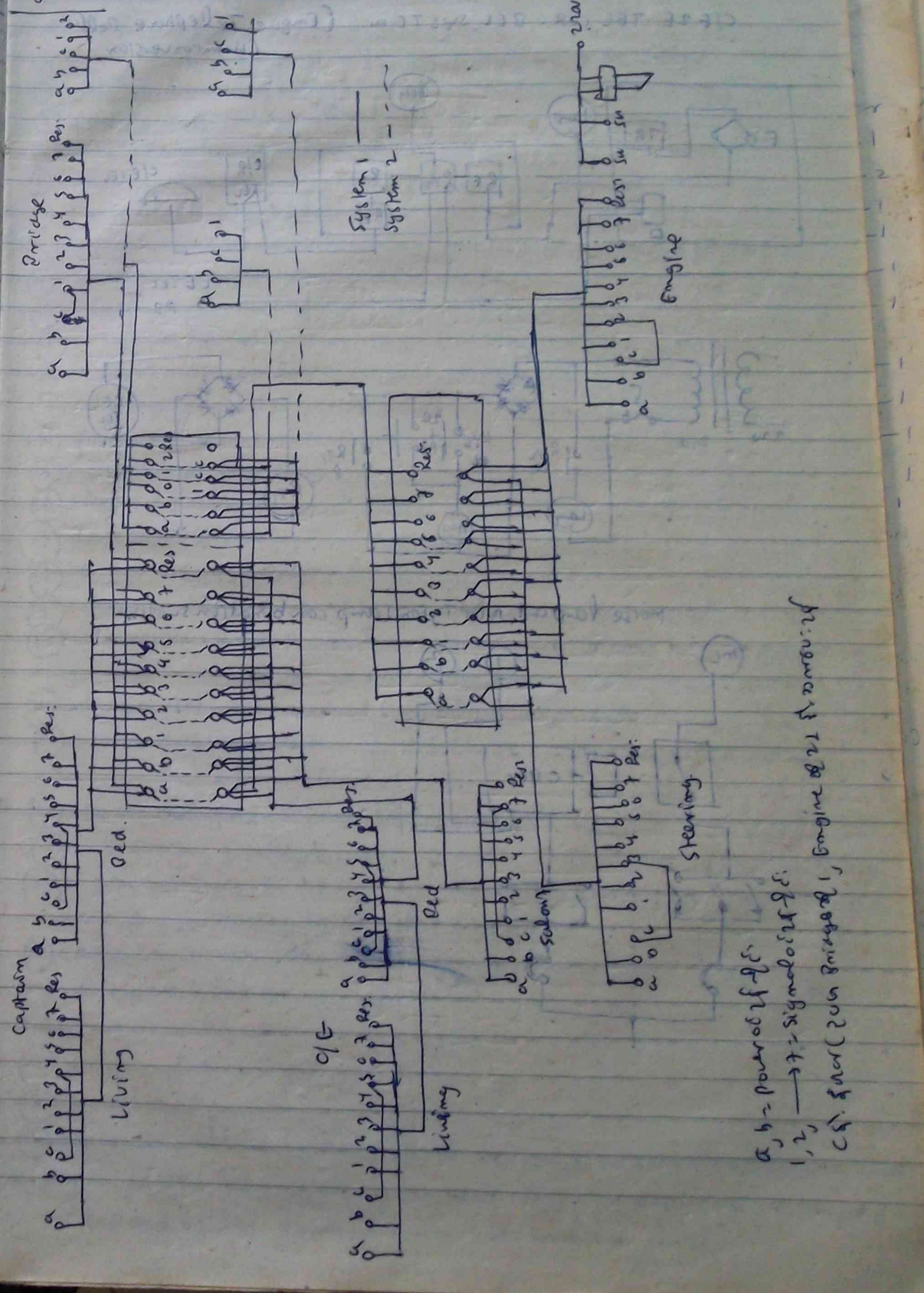
Internal Telephone System







1. Ruder omasch steering
2. Engineroom
3. wheel house
4. Chiefengineer
5. E/R
6. Salon
7. Captain.



BURMA FIVE STAR SHIPPING CORPORATION

HEAD OFFICE

Rangoon 22nd February, 1973.

The Chief Traffic Manager,
M/S Sule Pagoda Chaf,
Burma Parts Corporation,
RANGOON.

Dear Sir,

M.V. "[illegible]"
[illegible]

We shall be most grateful if your organisation carry out the following repairs on the captioned vessel.

JOB

1. Diesel oil filling pipe (8"x150mm) approx.3.5m to renew it to be patched up by welding after taking precaution against fire and explosion.

2. Sea cooling pipe (150mm ϕ x 2.5m) U-bend to 22 j-sheet smaller to renew it to be patch-repair.

3. To renew following 3.3/4" steam heating & steam drain pipes.
(a) 1 pc. 45mm ϕ x 2.5m length(in.) 22 Nos.
(b) 1 pc. 25mm ϕ x 2 " " "
(c) 1 pc. 45mm ϕ x 3.5m " 84.4 "
(d) 1 pc. 25mm ϕ x 2 " " "

4. To renew sea cooling inlet pipe to Gen. jacket cooler, it to patch-repair. (this is repeat indent item no 22/82)

5. To make & supply one qty mud fitting pipe to be used as necessary.

6. To rewind 4 nos. 7.5 motor-armature(work-areas) and its commutator to reconditon.

7. To make and fit 4 nos. of permanent bracket-fixtures for funnel lights.

8. To make and supply 40 nos. of resistor for engine light's water-tight bulkhead.
Above castings to be fitted or intimated by Q/S or S/Os

9. To reconditon 2 sets of generator's Hub-bearings.

10. To recondition 2 nos. of valve-plates of Ingersoll compressor.

11. To make & supply 2 nos. freon-gas charging pipes as per sample.

rpm by Tacho → 105 (ဘေးဘီးပေါ်) / Fuel lever.

sw temp → PIP

s/w cooling aft cooler → F.W

F/w cooling → F/w cooler မှ in/out.

inlet jack

Cylinder → ဘေးဘီးဘက်

LO (in/out) Piston cooling

Cyl: exhaust

Pressure

Starting pressure

s/w cooler → main board

F/W

LO → PIP

Piston Rod

Liner - all

Bearing

Camshaft - ဘေးဘီး

Sensor:

Air cooler

Sea: 46 sout

outlet

Sea 44 St

RW 37 .34

sw cooler out

inlet -30

F/W cooling S3 / S9 Turbo

S8 S6 blower

TID Setting

SW 7

မှ နောက်ဆုံး ဘေးဘီးဘက်

Temp

From Tacho → 105 ဘေးဘီးဘက်

F/w cooler

Tank - cap - vent, faulty injector or pump or incorrect timing

⊕ caused by lack of ventilation, too much load, lack of engine oil, excessive wear or choked exhaust

ROUTINE MAINTENANCE

After the first 20 hours.

Drain and refill the sump (1½ K)
while the engine is cold.
check the tightness of all nuts and bolts using a torque spanner where applicable.
check the V/V clearence and decompressor setting.

Every 50 hours.

clean the oil bath air cleaner, if fitted and refill with clean lubricating oil to level indicated.

Every 250 hours.

Drain & flush the sump (1½ K)
charge the lubricating oil filter element (G).
Tighten the filter bolt to correct torque. DO NOT OVER TIGHTEN
Refill the sump (K)
Remove excess carbon from the exhaust system.
clean the vent in the fuel tank cap.
while the engine is cold.
check the tightness of all nuts and bolts using a torque spanner where applicable
check the valve clearances and decompressor setting
lubricate the control linkage.
clean, check and lubricate the handle starting equipment.

Every 500 hours

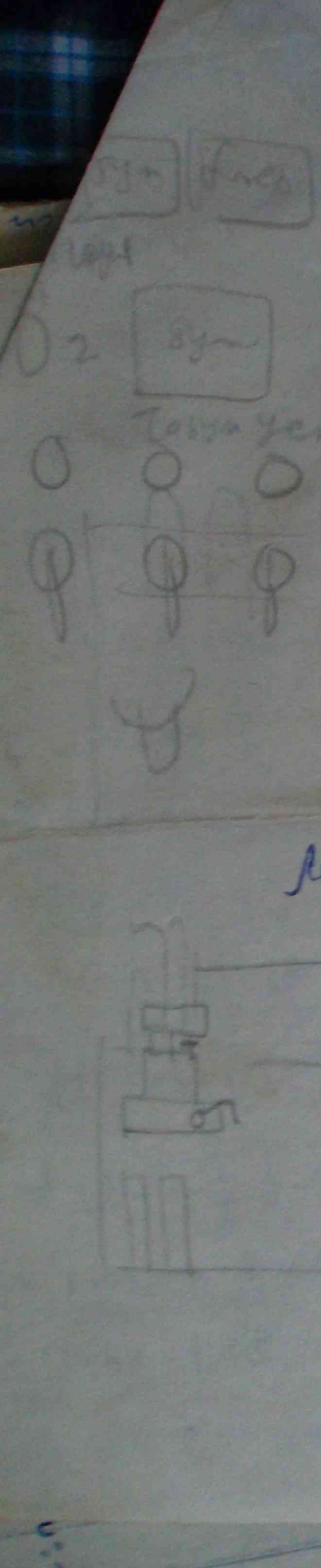
Change the paper air cleaner element (s)

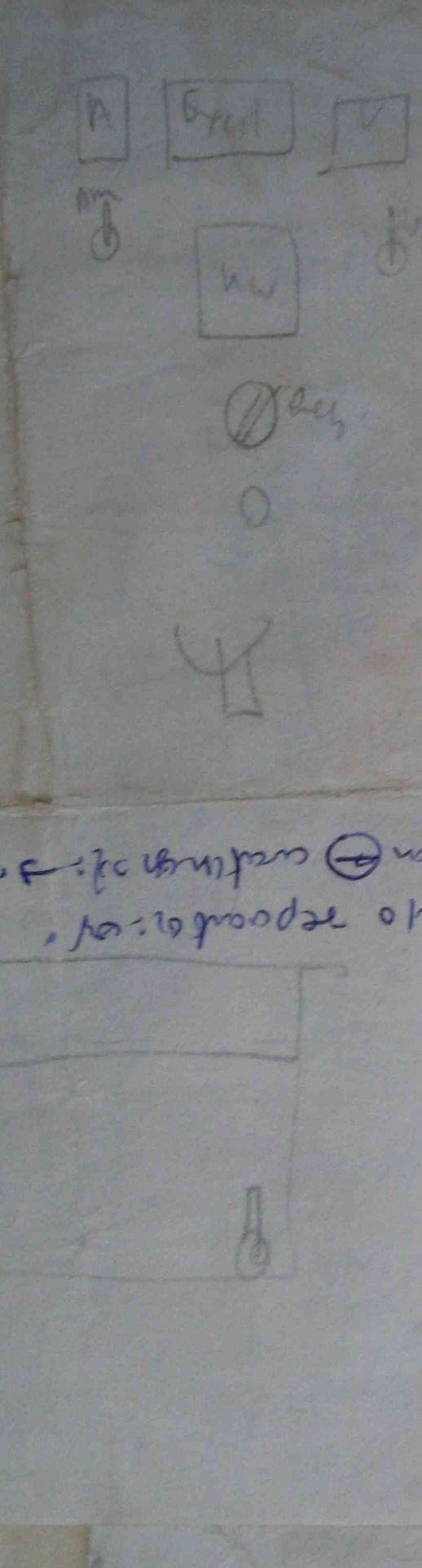
Every 1000 hours

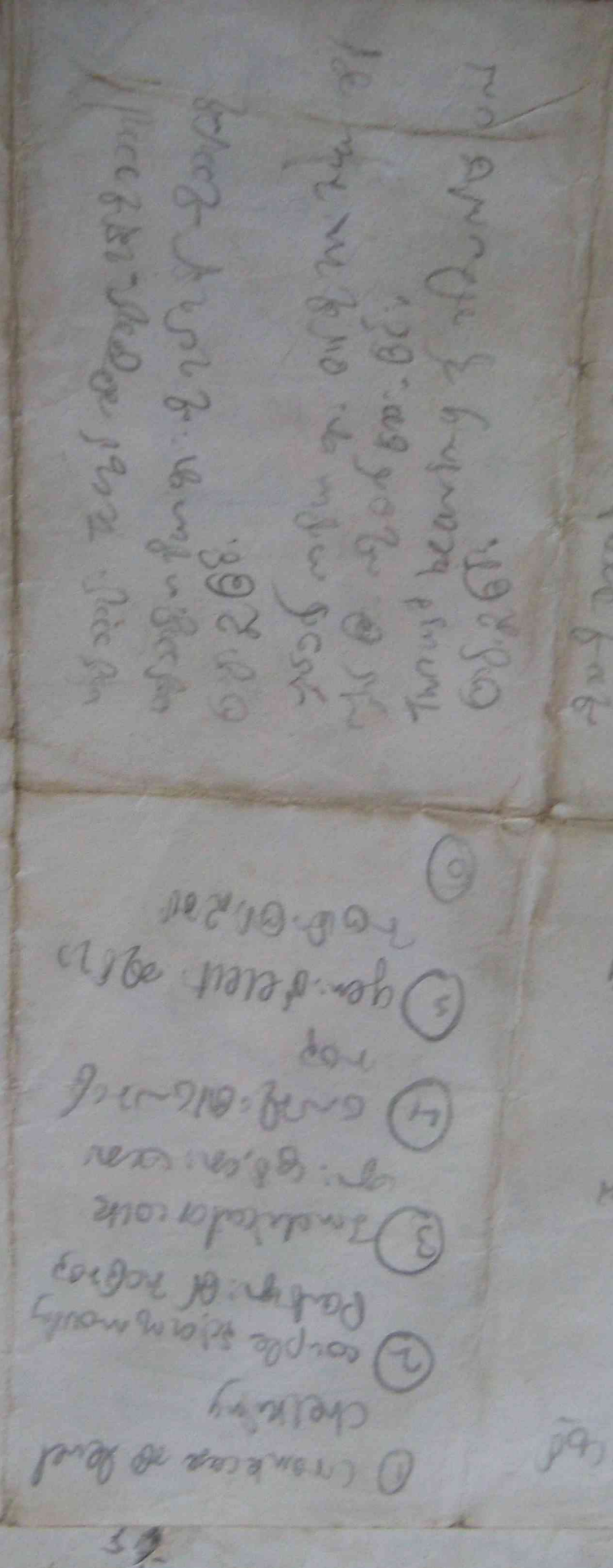
Drain and wash out the fuel tank (E)
Change the fuel filter element (F).

Every 2000 hours.

Clean and test the fuel injector(s)
Decarbonise
Drain and remove the sump and clean the oil pump strainer
Depending on how the engine has been used and maintained it may be necessary to check the large end and main bearings and piston rings.







NO33 cool → Pillamp 3

Flw pr - 1.58

Flw → 2.55

Tlo - 1.7

Flobef. fill - 3.3

Scav → .15

Bear → 1.12

piston → 1.59

camshaft - 3

Tcino 108 — Hoplp 2.6

Jac 53 — Flw 3

Flw 2

Pillam Llo in 40

Ey 400 cooled

Cleanf: Glcanf: max 360°C

2 → 290

Alrmodel Gclean: 280 290

Flwoutcool 42 40

incout 5659

Tcwhotbar 300 200

Jac 51 359

Go

Hotcooler

Hoplp 2.2

Tlotcooler in 52 → 56

out 52 → 54

Pilot light on

G1 G1 alarm

Reg 3pA → 38

Tosyn-gen: 0 ← 0 0 0

Sgn freq lighting

Pilot lamp

voltage

key N

voltage reg: 28

freq: 50 → 52 - 60

dark-load

→ loadshare

Reg 5 7 5A

Reg Reg

Reg - Reg

C/O 4.7

C/W 1.68

T/O 4.45

S/W .9

[illegible] 78

OWT = 68

Jac $3,52, 54, 53, 54, 57

Exh 260 230 250 280, 180, 190 Load 60

260 230 250

L/O 2.15

[illegible]

Temp = 154 94

out 64

Jac 60° 59 60 | 64 62, 60 63 61

Ex 150 140 | 100 100 [illegible] 100, 160

70

Load + 60 [illegible]

Fridge 1

D[arg] = +6

meal = −12

Blood T P = 76

S = 80

Hawell Tk = 38

C/L Tlevel = 75

Er = 375, 390, 370, 380, 385, 370, 405

Jac = 58, 58, 57, 57, 56, 57, 56,

260 230 250

Turbocharger

	F	A
=	320	320
Jac =	60	58

Rel.

Afrscav = 46, 37, 45,

Attcyl

Aftercooler F = 61 A = 64

SW = 37

Turbo cooler IN 54 SW IN 52

out 52 out 54

Flow meter

ကြိုးစင်း

① S/w Pipeတင်း ၊ ပါဝင်ခဲ့ခြင်း

② L/o Pipeတင်း ၊ ပါဝင်ခဲ့ခြင်း

③ Nozzle cooling Pipe ~~တို့~~ Stand ကြိုးစင်းခြင်း

④ T/o oil Pipeတင်း

⑤ Aircooler ခွင်

⑥ အပို့ဝတ္ထုတင်း ၊ ပါဝင်ခဲ့ခြင်း

⑦ Aircompressor နှံ့ဝ်ကို့ကား

⑧ BoosterPipeတင်း ပြီး အစီအမံ

⑨ ~~Turning gear နှင့်~~ ၊ glandတွေ့ ၊ Turning gear ကြိုး

⑩ cockတွေ့ခြင်းကား, mainstopvalve ကို့ခြင်း

⑪ aတွေ့ကတ်

⑫ governorတွေ့ | ⑬ Fuel leverကြိုးတွေ့

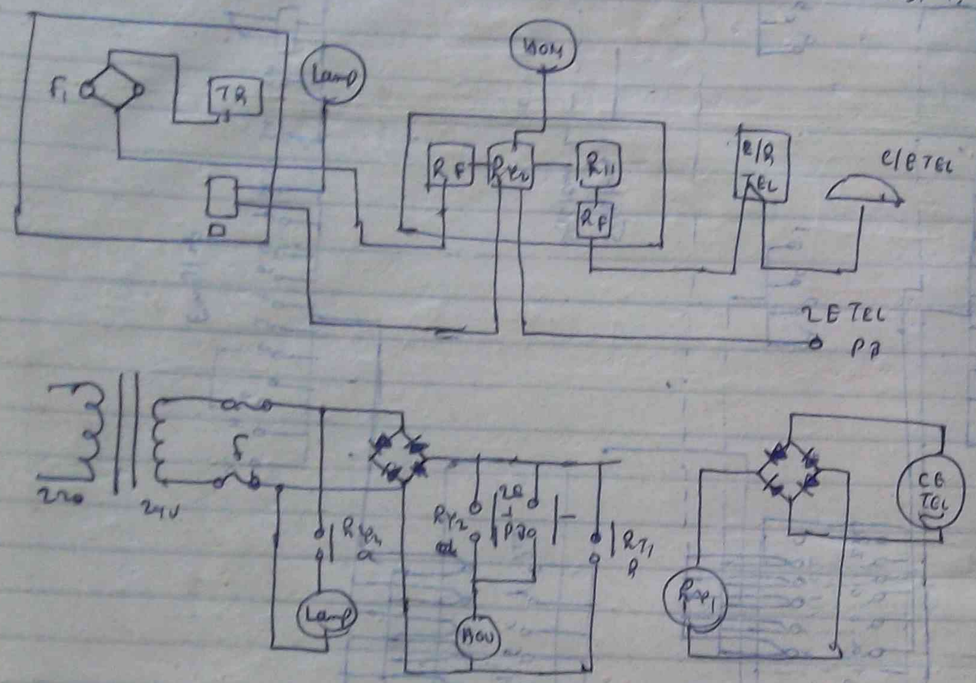
⑭ ဝယ်း

ပြန်ကြိုးပုံ

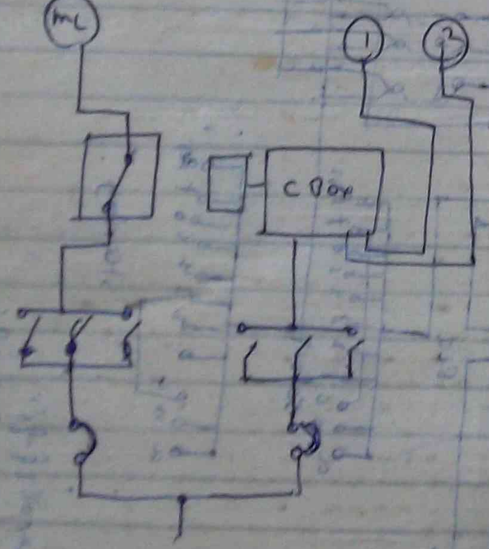
①governorတွေ့ခြင်း ② အစီအမံ(governor ပြန်ကြိုးပုံ) ③ ဝင်ပါဝင်ခြင်း ④ အပါဝင်ခြင်း

⑤ဝင်ပါဝင်ခြင်း ⑥ aတွေ့ကတ် ⑦ governorတွေ့ခြင်း ⑧ ဝယ်ကြိုး

C/E 26 TEL COR-BEL SYSTEM (Engine Telephone Bell Thermconversion,



morse lamp and Tyfon lamp combination switch.



(Elongated:)

1. Crane brake liner adjuste checking of brake liner
2. motors clean with electro cleaner
3. passageways, cabin lighting replacing, repairing
4. Checking loose contact Lamp
5. Heating, blowing, servicing emergency blower
6. cargo light checking
7. Operation of cranes checking, repairing, maintainance
8. mast light checking
9. Fusing bulbs checking
10. Booster pump motor servicing. (meter megger = 20 mΩ)
11. master controller loose contact repairing
12. serving the faulted winch motors
13. portable blower checking
14. Black out checking
15. Deck light checking
16. Telephone checking
17. CO_2 alarm → alarm test
18. Lo Lo heaters → check and repair thermostat contacts
19. Brake work out properly → brake coil short ckt, replace with new one
20. Slip rotor → Terminal chipping repaint
21. winch motor Inspection → fault study, brake, terminal, commutator,
22. Brake casing → cover chipping off, repaint
23. all winch, brake, brushes, master controller contact checking
24. Em batteries → All corroded batteries connection bar removed out, serviced, refitted, rubbed,
25. cargo cluster → Short ckt: cargo cluster light checking.
26. Room ventilation.
27. Fore deck light
28. accomodation light
29. workshop
30. Lo heater, checked and found leakage water dropped on lub oil heater from No 3 generator engine, drop water wiped up and heater covered with tarpaulin sheet.

(32) H3 Stand by winch → Driving pinion extracted out from old motor fixing up spare motor, refit terminal, pinion, fill gear oil,

(33) F/w Hydro phone Tr - pressure dia pharagm blow out, removed renewed and,

(34) Main Fusing checking.

(35) Converter room ventilation

(36) Aft winch → fault finding, starter box, H/V coil burnt, removed faulty coil and renewed with spare coil, fixing up,

(37) H3 Stand by winch → motor out of order → checked, armature connection wire were melted,

(38) welding cable setting.

(39) motor → all motor covers & yoke rusty Paints chipping off and repainted with under coating paints

(40) Armature 45mm, 50mm, field 60mm, 1000mm, Interpole 40mm, 500 mm.

(41) Converter commutator loose → heavy sparks, report to C/E recall share repair.

(42) Lamp loosen → soldering.

(43) motor peeping → tonnage hatch.

(44) Turbo oil Pump → P/P side repair report.

বিবরণ

(1) CRT: ফ্রেম ভাঙা।

(2) Transformer
(a) [illegible] কার্বন ঢুকে গিয়েছে। (Plan way: ১ টা)
(b) Pt. by Pt. connection ঠিকমত আছে কি না, দেখা।
(c) ৪৫ V ঠিকমত আসছে কি না। সে জন্য connection ঠিক আছে।
(d) Focusing coil connection ঠিকমত by pass করে।
Control box ঠিকমত বসে কি না। সে জন্য by pass করে।
এটি ঠিক না হলে CRT: out put: control system ঠিক আছে।

(3) সব ঠিক থাকলে CRT: এর overall ই হয় ফোকাস।
ফোকাস change করা

(4) সব ঠিক থাকলে by pass করে দেখতে হবে ফোকাস হচ্ছে কি না।

(5) CRT: এর tube এ Pt. by Pt. fault finding করার জন্য Plan করে নিতে হবে।
Plan Pt: অনুযায়ী by Pass করে দেখতে হবে। result এ terminal ঠিক আছে, কি. connection ঠিক আছে কি না। সে জন্য charger এ যে. ভোল্টেজ আসছে কি না। সে জন্য ৪৫ V. ঠিক আছে কি না। সব CRT: ঠিক থাকলে CRT: ফোকাস হচ্ছে।

Type of lubricant	
MALINA OIL 30	M/E & G/E crank case comp: crank case Propeller shaft Bearing.
Alcara oil 50	C/L OIL
Turbo oil 733	Turbo charger Bearings
OMALA 220	WINDLASS & WINCHES Enclosed gears.
Clavus 68/46	Fridge comp & Hydraulic system
Rotella 50/40/30	Life boat engine crank case
ENSIS Fluid	Rust protective
Strombus L 73/4630	Stern tube gland
Cardium compound	wire rope lubricant
Oromus B	T/C cooling water
ALVANIA Grease	
HSD / Kerosene	
TGD (Tellus GD)	Hydraulic oil for NOL crane.
T/37 (Tellus 37	

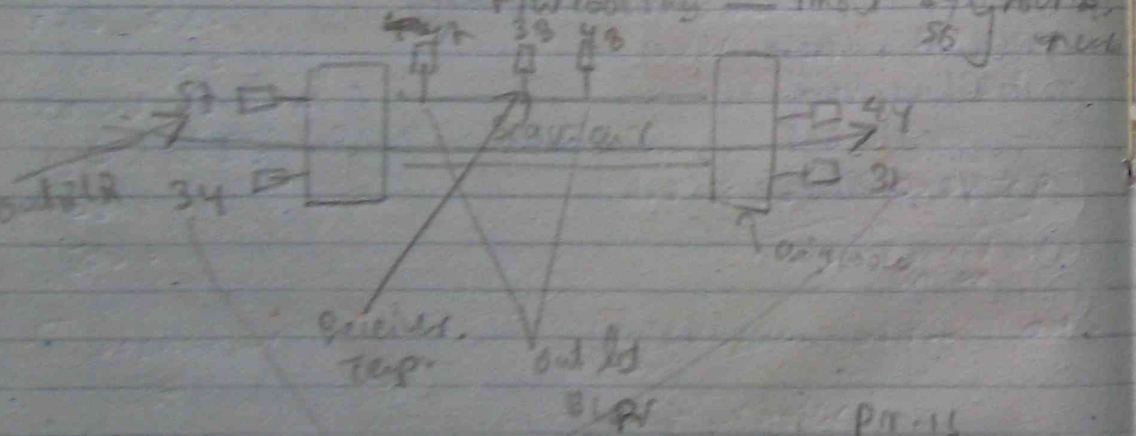
RPM by Tacho → Governor speed
Fuel lever → core
SW cooling - after cooler { F.W, H.O, nozzle cool } | operation 62s

~~Inlet~~ F/W cooling
Inlet Jacket
Cyl: dis → governor by coolant
H.O in out
Piston cooling
Cyl: Cool
nozzle cooling

Par
S/W cooler main board
F/W
H.O → P/p gear end
PISTON Board
H.O pressure before Air
bearcam shaft.

aircooler
Governor speed
Jack Ground

Turbo blower



Out
Cylinder
Piston
Spool Lift

Turbo bearing pressure, Temp
13 60

H.O cooler Temp: out
pressure main board,

H.O filter ~~Out~~ Pressure, Temp: Inlet
To Heat Exchanger
aircooler Spool Lift
Pressure

Fuel lever pressure (nozzle cooling)

L/o sup, Jack cooling via High DT, Low pressure drain via, piston cooling dripoiler, (Drip Positioning, air receiver inlet, air) OR
cap at let go.
Load on / air comp load at 2nd stage pressure breaker and air comp cut.
Low pressure via oil start button pressed
starting load on 2nd
Danger on L/P via oil pressure air drain valve on
inf. of air comp by go. Bearing; (counter drain
air drain valve load reduce.
dripoiler on L/O off.
Cut off. Danger on air drain valve go, L/P via oil stop
button press.
air receiver air cap drain via Danger: drip
oiler on suction.

(High tank pressure)

Diagram
Rest
Hydraulic:
S:
Pressure
Cylinder:
Ex
Jac

Turbocharger
F A
Ex
Jac
Air → X ^ X → receiver
Engine

P.R cooler F.W A.W
SW SW

Turbocharger
cooler in SW in
out SW out

Hydraulic S. Body Tap
(Start assist shut off valve)

Nozzle cooling in — out

Flow meter
G.F.I
L/O F.W
T/C S.W
L.O Temp in — out
Jk
Ex

L/o
F.W
L.O Temp in — out
F.W cooler
(Water)
L/o cooler (D)
(S)
S/W Pipe
L/o Pipe
L.O FILTER IN — OUT
PURIFIER TEMP
TURBINE BLOWER TEMP — PR
L.O TEMP

Rev: counter ഉപയോഗം:

① 12 മ 4 floor ൽ Rev: = a
4 മ B ——————→ b } diff = b-a.
10 ലിറ്റർ വെള്ളം 2 floor ൽ 240-10 = 230 min:

∴ rev/min = $\frac{b-a}{230}$

10 ലിറ്റർ ന് rev: = $\frac{b-a}{230} \times 10$ = . ( ) 3 decimal

∴ Total rev: counter: = $b-a + \frac{b-a}{230} \times 10$

Unit = rev: counter × 0.0982 = ₹.

② consumption/watch കണ്ടുപിടിക്കൽ:

ഒരു consumption/watch = $\frac{\text{diff: of 2 Em} \times 0.85}{1000}$

1 ലിറ്റർ consumption/watch = $\frac{\text{diff of E-meter reading} \times 0.95}{1000}$

③ Pre noon ഉം noon ലിറ്റർ sounding, ലിറ്റർ sounding

Pre noon sounding = (consumption/watch എടുക്കുന്നത്
ഏത്, 12 മണിക്കു shop ൽ, 12 മണിക്കു watch
(2 ഫാൻ, ഒരു ടീവി ഓൺ ആക്കി വെക്കുന്നു
ഒരു കറന്റ് ഓൺ ആക്കി
consumption = ₹ 202:

④ ലിറ്റർ supply ൽ:

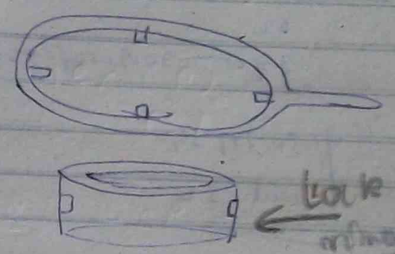
ഒരു ടാങ്കിന്റെ = 30 cm → 0.3 m

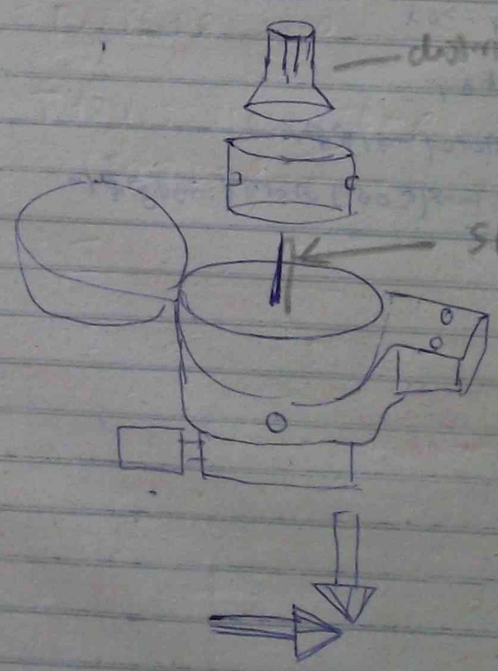
m	m^3
0.7	
0.5	5
0.33	3 ⟹ 3200
0.3	

ആകെ = 6 ടാങ്ക് = 6 ടാങ്ക്.

⑤ ലിറ്റർ ന്റെ: Total ഒരു ദിവസം Lit

ഉച്ചയ്ക്ക് oil = Lit
2 ലിറ്റർ = Lit
1 ലിറ്റർ = Lit
actual Σ = a Lit
official = b Lit
diff = b-a Lit =





worm gear ഓടിക്കുന്നത് centrifugal force ഉള്ളതുകൊണ്ട് worm gear ന് ചുറ്റും ഇല്ല. motor ന്റെ driver ന്റെ ആകെ ഭാരം ഉണ്ട്.

shaft → steel → worm → Brass
worm → copper → ഇവ ഓയിലിൽ ആണ്

worm ന്റെ ചുറ്റും 60 cm ഉള്ള coil ന് 45 mm ആണ് ഉള്ളത്

③ Pre noon & noon H/o Sounding, L/o.

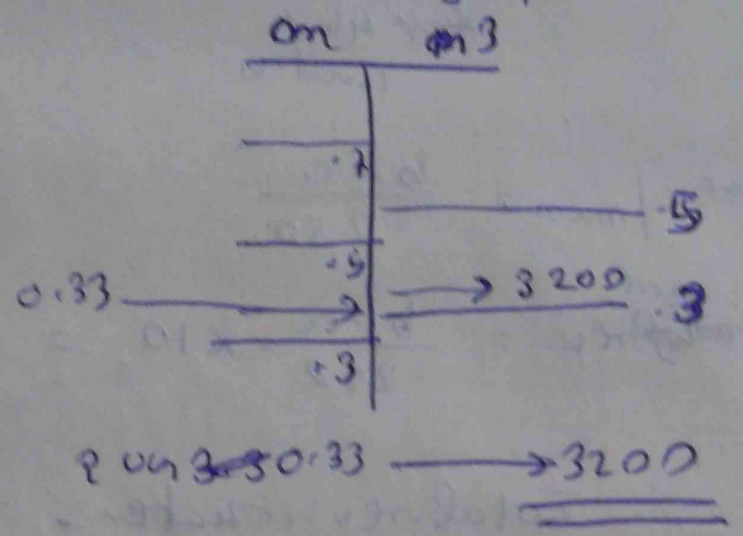
Pre noon sounding — (consumption / watch

w 6½ 12 & 12 & Pre 6 wat (na)

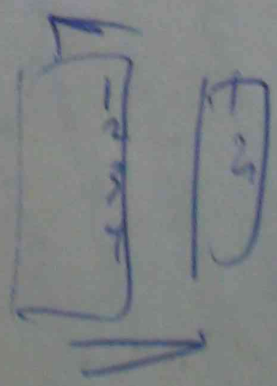
(2q.)

④ H/o sup ಭಾರ:

ಆಳ 0.3m cm = 30 cm → 0.3 m



ಆಳ 0.33 → 3200



Revolution counter ಪರೀಕ್ಷೆ:

(1)

12 ಕೆ 4 ಕೆ ಅಂಗಡಿಯ Rev: = a

4 ಕೆ 8 watch ಗಳನ್ನು ಇಡಿ.

10 ಡಿಗ್ರಿ ಕರೆಂಟ್ ಅಂಗಡಿಯ Rev: = b

diff: = b − a = ⊛

10 ಡಿಗ್ರಿ ಕರೆಂಟ್ ಅಂಗಡಿ = 240 − 10 = 230 min

for 4w watch

$\therefore$ rev/min = $\frac{b-a}{230}$

10 ಡಿಗ್ರಿ ಅಂಗಡಿ Rev: = $\frac{b-a}{230} \times 10$ = ( ) 3 ಅಂಕಿಯ ಅಂಕೆ

$\therefore$ Total rev: counter = $b-a+\frac{b-a}{230} \times 10$

ಲೆಕ್ಕ Unit = rev: counter × .0962 = ✓

(2) consumption / watch ಪರೀಕ್ಷೆ:

D/o consumption = $\frac{\text{diff: of 2 floor meter reading} \times 0.85}{1000}$

H/o " = $\frac{\text{diff: of Fm reading} \times 0.95}{1000}$

Diag +7
mesh -120 mm dia

cyl: Rad → (accounting 20 mm rad)

after

After over 44 37 44

Before

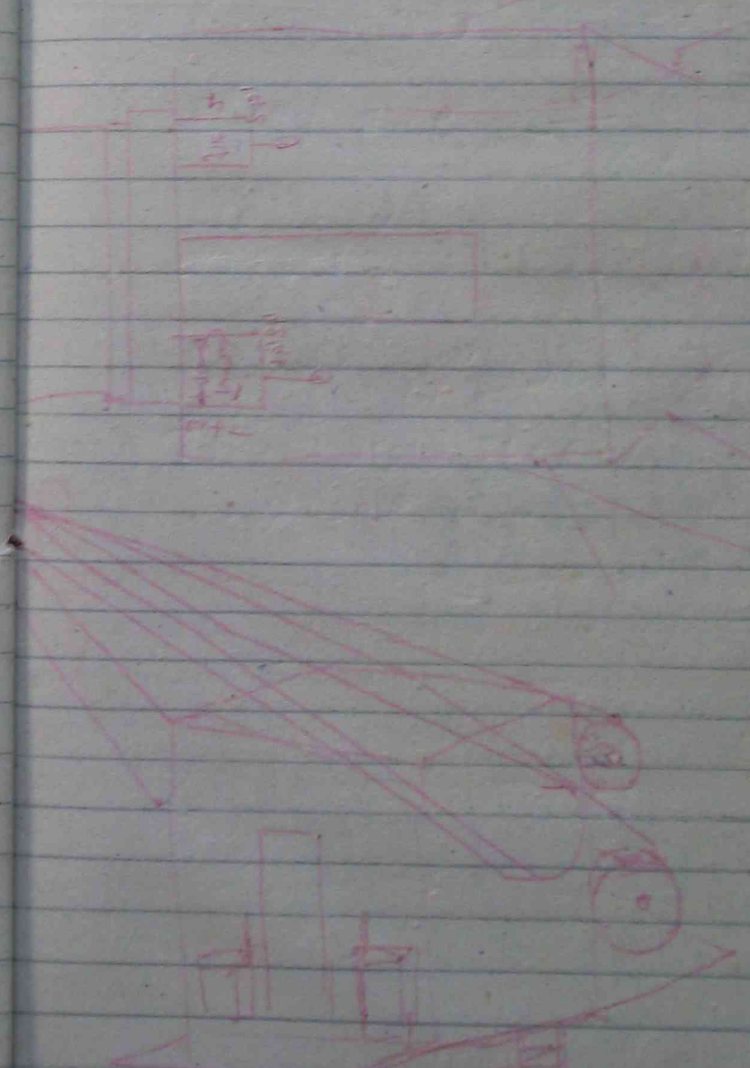
After over F D
57 62
34 ← Before

T/O IN 54 | SWITCH 54
out 52 | out 52

Before

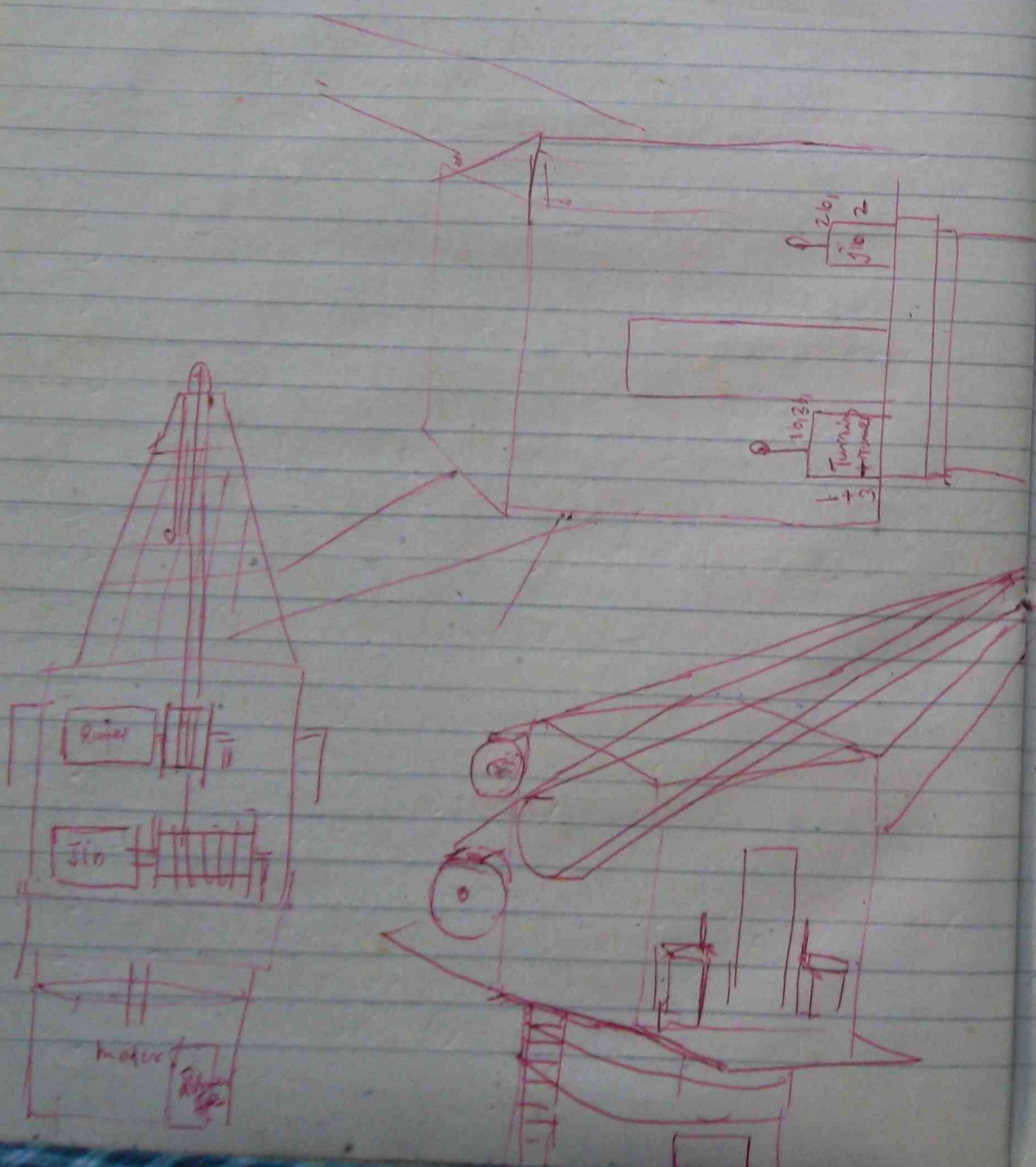
E/G No 5 F/w = 1.35
T/O 43 S/w = -01

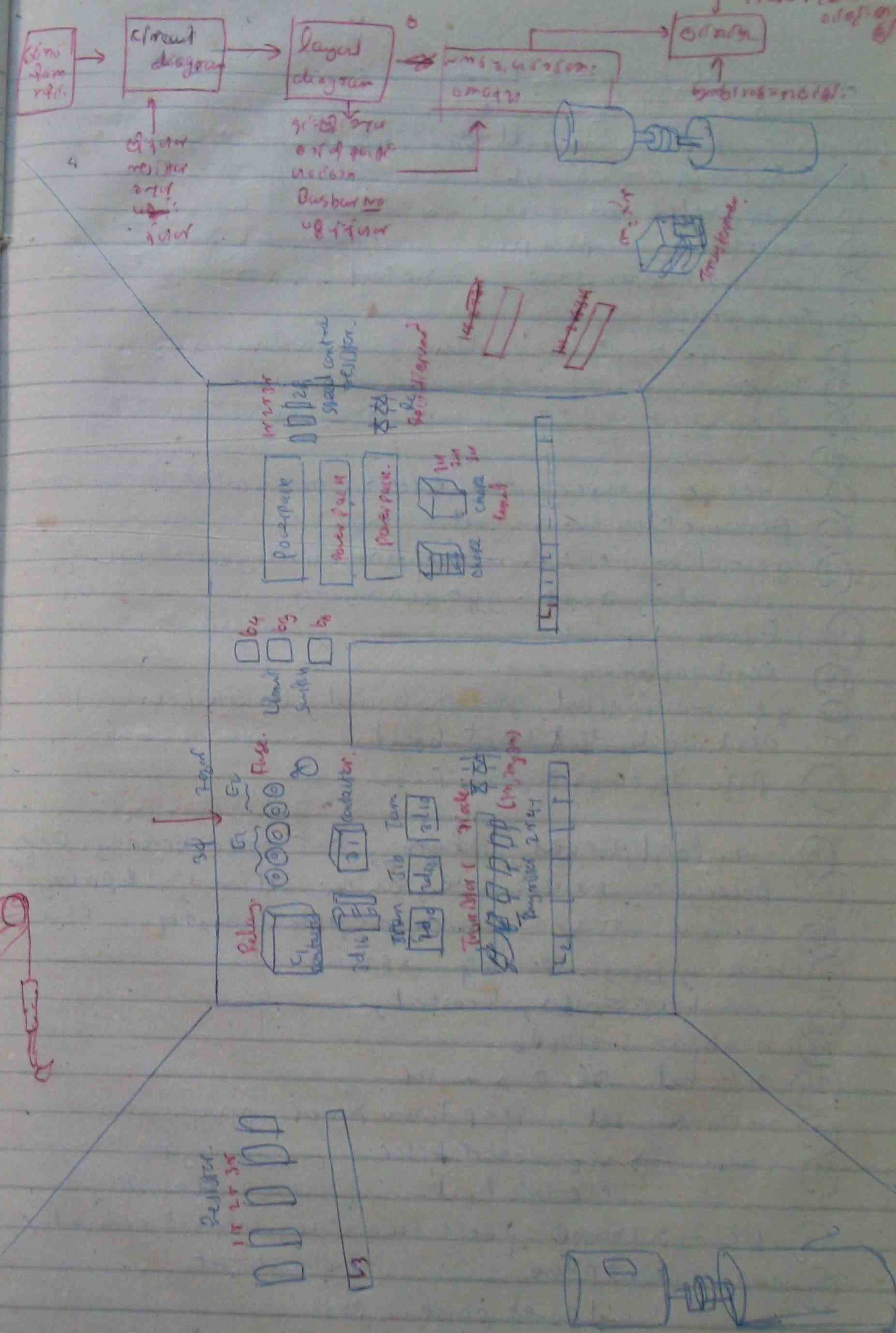
i/o Cm 73 out 64
Jac 900 Before
→ 2806 mm (200) Before



- Purifier [illegible] Motor [illegible] 1.5, 1.6
  [illegible]
- [illegible]

Purifier [illegible] | [illegible]
Bilge, Ballast [illegible]
Exhaust temp [illegible] speed [illegible] | fuel lever [illegible]
[illegible]
[illegible]
Sounding [illegible]



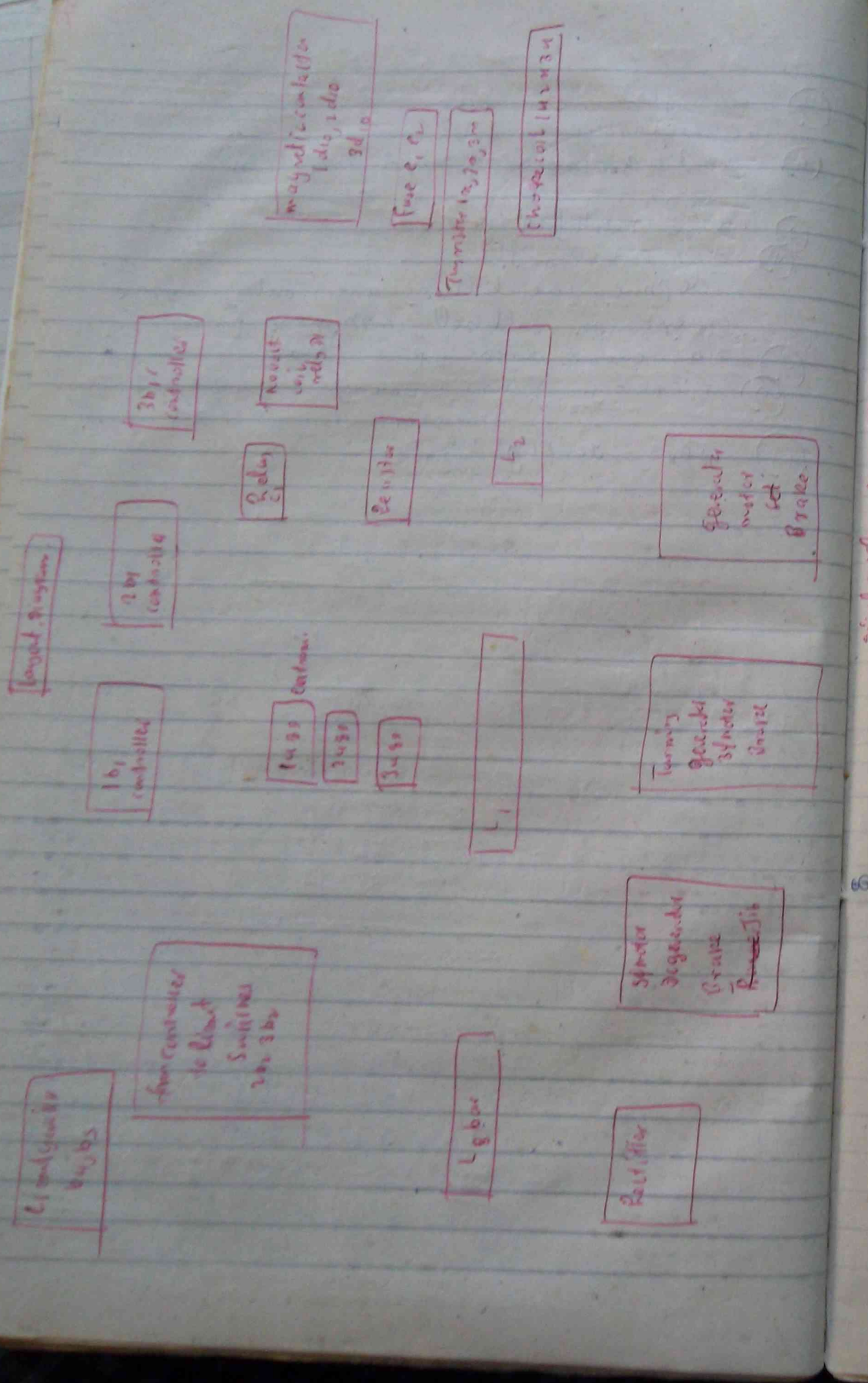


Electrician Exam.

1. diff: bet: prf: & sec. cell (F.B Page 15
2. Hour storage & charge "
3. Hydrometer (m: year)
4. rectifier page 121
5. series, ||l, open, short, grounded page 28
6. Trace ground.
7. single pole, double switch. 3 way switch 4 way switch
8. Fuse (Ann Can (L&T II Lab).
9. Beam fuse | R.I.I (5th year Power system
10. CB
11. wire size, megger, temp: effect, accumulator (Ref: G.T Imeas:
12. permanent, electro magnet page 41
13. generation, residual magnetism, voltage control 5th yr E. mech.
ammeter, 2 gen:, gen: changing. "
14. ||l gen: p-209
15. equalizer bar G.T.I DC
16. gen: moving part, gen: on board, brush (carbon)
dead board, dead front board (Hydrometer, area
17. Polarity change 2 gen: p 252

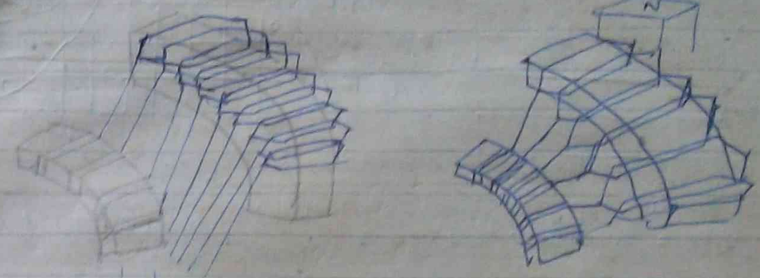
18. over load prevent, ||l gen:, hot motor bearing (Belt.
19. power cut:, marine code, under cutting, Slipring. Ref.
20. characteristic: of shunt, series, compound motor p 231
21. checking, brush spacing → p 264
22. commutator smooth, rheostat,
23. brush pr: 1 → 1½ lb
24. diff: bet: DC & AC motor
25. motor gen: set, step down power p 174
26. vaccum → CO_2 smoke detector | G.T Fire fighting
electric light | Wiring & Fitting.
27. AC → DC charge {rect: Cu oxide, Ubrator converter
28. H.P, salient pole motor gen: set
Sound power phone. p 288
29. fire alarm circuit: ③ F.F.A + Diff duty

30. controller p 348
or cam controller,
31. what type of motor is main propulsion
sys:
32. change rotation
33. IC (Intercom:)
Telephone, general alarm, accumulator, engine
order graph, call bell, iron mine {Block}
34. dir: reverse motor { P R J I 5th yr
35. sparking. { brush wearing weak field
arm short ckt: G I J DC
36. gen:, water pl p. (Block)

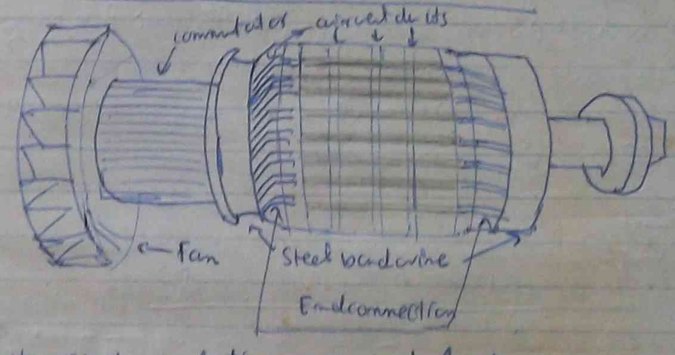


General Electrical Knowledge. (1)

Lap or multiple winding [Principles and Practice of Electrical Engineering] By Gray - Wallace



wound rotor armature for 4 pole dc m/c



Shunt motor speed regulation — constant load or speed regulation motor of

ward leonard → steel mill for reversing rolling mills, seamless tube mills, Hy medium speed elevator in tall building, mine hoist, Paper mill wire, Railways, car dumpers. gun turrets.

Regenerative action in ward leonard - ward leonard system locomotive can run motor increase speed upto Fg ↑ E motor greater than speed of generator Ia reversed generator motor. motor Ia reversed generator motor trolley wire electrical energy of source of motor, motor friction brake source Diesel Electric train of source

use of flywheel in ward leonard

speed large fluctuate upto 2 h

compound motor fluctuate speed upto. Small series field source

Flywheel and compound motor — main motor peak load upto motor speed grid rises flywheel, flywheel energy of inertia of, energy stored over speed smooth source

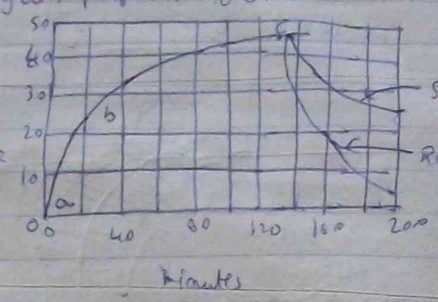
speed and cost

low speed motor are much more expensive than high speed motors or same rating. (Std design 4-48 rpm speed)

Heating of Electric machinery

Heat → temp: of surrounding air temp: ওপরে উঠা

effcy: curve of constant load dc machine



Heating curves of armature winding of electric machines.

ঘোরানো যন্ত্রের temp: দ্রুত: বাড়ে heat বের হয়ে dissipate হওয়ার চেয়ে, temp: rapid ~~o~~ increase temp: constant temp: এর পর heat যে হারে dissipate হয়: heat এর সমান হয়ে যায়, temp: rise হয় loss এর ~~o~~ curve অনুযায়ী load এর উপর temp: নির্ভর করে: stationary, running দুটোর ক্ষেত্রেই running এর বেলা heating বেশি হয়।

permissible temp:

Standard হল insulation এর breakdown হওয়ার।

Classification of Insulating materials

Class	Description	Limiting safe hottest spot temperature °C
A	cotton, silk, paper etc impregnated with varnish and enamel coatings on conductors	105
B	mica, glass, asbestos, other inorganic materials, in built up form combined with an organic binder	125
C	mica glass, asbestos with silicon binder	175

Limit output of Electric machines

Limit o/p নির্ভর insulation এর upon এর উপর, temp: rise এর sources এর উপর ~~o~~ cooling system এর উপর। ~~o~~ commutator এর জন্য sparking, overload এর জন্য sparking হয়।

Rating of Electric machine

Continuous rating

Temp → room temp: 40°C এ hottest spot এর temp: steady হয়ে যে load দেওয়া যায়

12.7 ——— 0°C ——— ″ ———

40°C এর উপরে temp: rise করে।

Short Time rating

নির্দিষ্ট সময়ের rating যা continuous rating এর চেয়ে অনেক বেশি হয়।

The short time rating of an electric machine is the maximum constant load that the machine can carry, starting cold, for the specified time interval without its temp: rise exceeding the standard limit.

Short ~~o~~ rating of an electric locomotive is usually about 30% greater than continuous rating of same locomotive. Temp: rise is same.

measurement of temp

① Thermometer ② by measuring increase resist: in conductor ③ by means of embedded temp: detectors

Thermometer — এটা দিয়ে: সহজে: accurate: করা যায়, ~~o~~ machine এর ভিতরে।

∴ thermometer এর use করা যায় না।

Changing এর ক্ষেত্রে

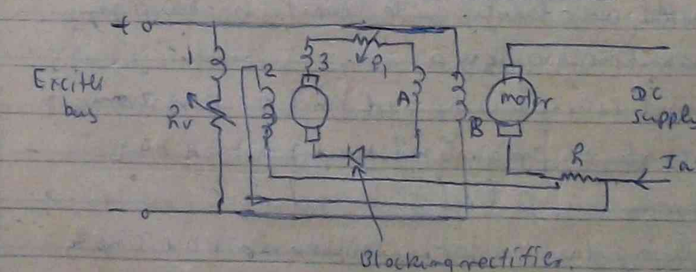
Resist: R = R₀(1 + αt), এখানে graphical method এ resistance measure করা যায়।

Embedded

Large alternating current machine (stationary armature এর ক্ষেত্রে) use করা হয়।

Thermocouple, resist: detector, slot এর coil এর ভিতরে use করা হয়।

Automatic control of winding Tension



Rototrol maintaining Ia constant.

motor speed constant রাখার জন্য armature এর উপর voltage constant রাখতে হবে।

Ia control করার জন্য Ia এর উপর voltage drop করতে হবে।

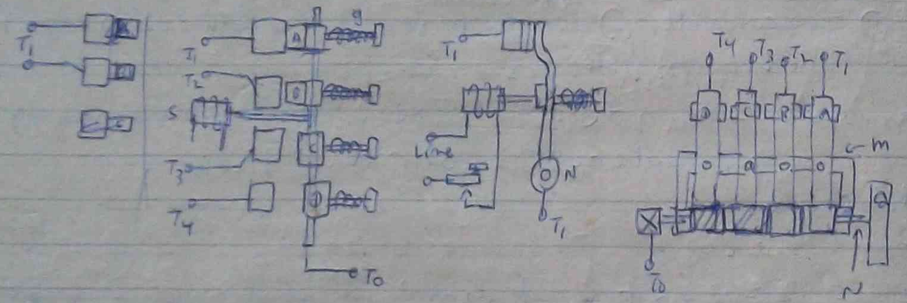
Field B = speed limit field.

Field A = Rototrol field. এর rheostat R₁ দিয়ে series excitation এর A, B field দুটো এবং pattern field নিয়ন্ত্রণ করা হয়। Resetting এর ক্ষেত্রে current এর direction change করে rototrol field এর opposed করা হয়। Ia বা voltage rise fall করলে pattern field এর পরিবর্তে pilot field দেওয়া হয়।

Pilot field এর pattern field কে control করার জন্য field এর current এর direction change করা হয় top speed এ running করার সময় stop breaker এর মাধ্যমে blocking rectifier দেওয়া হয়।

Field reverse current ... motor ... bursting speed ... bursting ...
(Automatic ... resistor step ... card ... Operated ...
magnetic controller with definite timing Page 179

A typical master controller switch with definite timing is shown in fig 16-13 when the solenoid S is excited by the closing of the push button switch P. It exerts a pull upon the rocker arm m, which carries the four contactor switches A, B, C and D. The rocker arm moves forward at a slow definite rate which is fixed by the clock work escapement mechanism O to which the rocker arm shaft is geared. The gaps between the contacts of switches A, B, C and D are progressively greater from A to D. As the rocker arm moves forward, switch A closes the switches are only held against the rocker arm by the spiral springs g which begins to compress as soon as the switches make contact.



Magnetic master controller switch with definite timing
Showing side elevation, front elevation and plan.

Thus the master controller is simply a mechanism that closes four switches in succession with a definite fixed time interval between successive closing. The time interval can be adjusted over fairly wide limits by changing the period of pendulum in escapement mechanism.

To open the switches, the solenoid circuit is opened and rocker arm is then forced back by action of a spring (not shown) which has compressed when the rocker arm was pulled forward.

One obvious method of applying this master controller switch is simply to connect the four switches in as the switches A, B, C and D of fig 16-12 and that is the way in which it is applied to small low voltage motors. Fig 16-14 shows the connections.

To start the motor, switch K (Fig 16-14) is closed and the start button is depressed. This completes the circuit through the operating solenoid S which closes the controller contacts A, B, C, D one after the other, thus cutting the resistance step by step. As the rocker arm m moves on, it operates the auxiliary switch y which short circuits the start button, so that the release of this push button will not interrupt the holding current through solenoid S at the same time inserts a resistance in series with the solenoid, so as to reduce the holding current to the minimum required and so save power. The current required to hold the master switch closed is considerable less than that required to close it.

The thermal relay provides over load protection by interrupting the holding current of solenoid S if it becomes too hot. To stop the motor the stop button is depressed. This interupts the holding current of solenoid S and the master controller switch then flies open.

⇒{ The connection shown in fig 16-14 are used for 110 volt motors upto 10 HP and 220 volt motors upto 20 H.P. The heavier currents of larger motor can not be handled by the contacts of the master controller switch. separate contactor switches are therefore provided and the master controller switch opens and closes their operating circuit as shown in Fig 16-15. To start the motor, switch K is closed and the start button is depressed. This completes the circuits through the solenoids of both the line contactor L and the master controller switch S. The line contactor L closes immediately, thus starting the motor with the full starting resistance in series. After a suitable time interval contacts a of the master controller closes, completing the circuit through the operating solenoid of contactor A, which closes and short circuits a section of the starting resistance. Contactors B and C are closed in the same way at suitable time intervals, thus cutting out all the starting resistance.

To stop the motor, the stop button is depressed thus interrupting the holding current of the line contactor L and the master controller switch S. These switches, which are closed against springs, accordingly fly open, followed by the contactors C, B and A as their holding currents are interrupted.

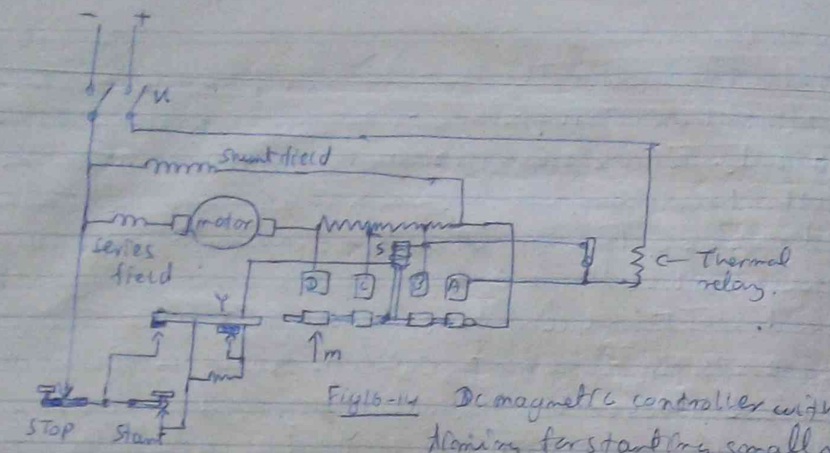
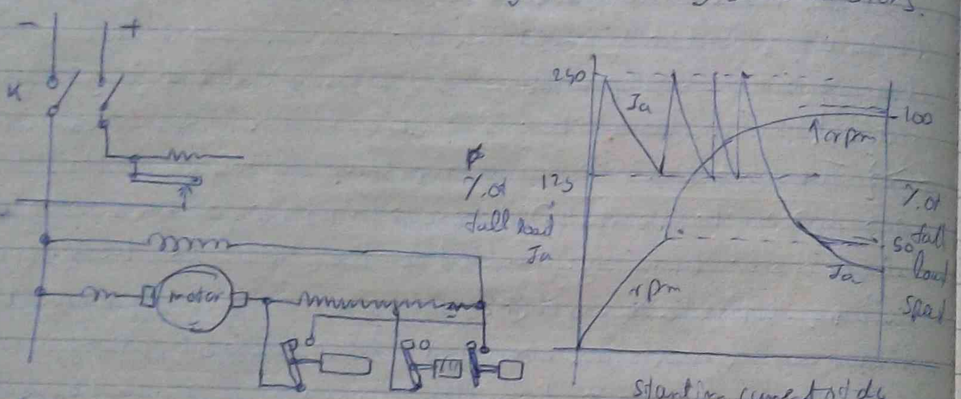


Fig 16-14 Dc magnetic controller with definite timing for starting small motors.



Starting current of dc motor when the starting resistance is cut out in 3 steps. Also per cent time of motor.

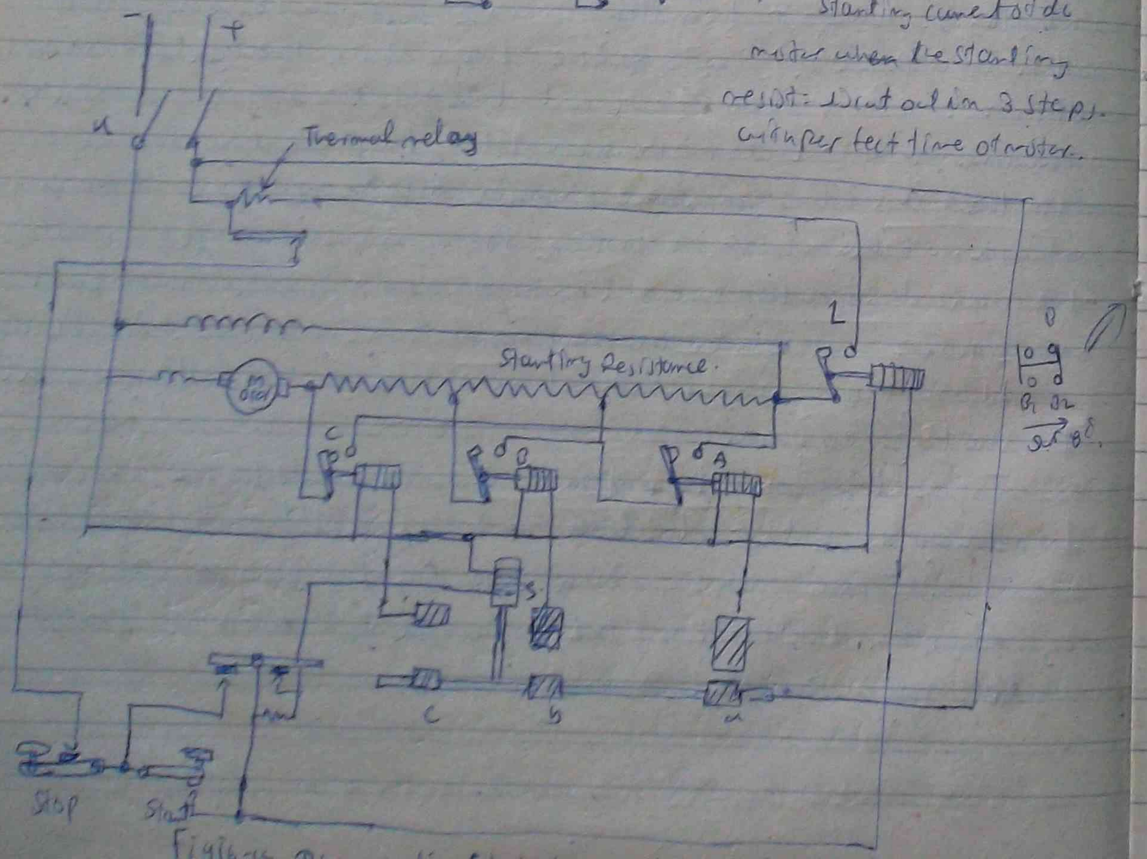
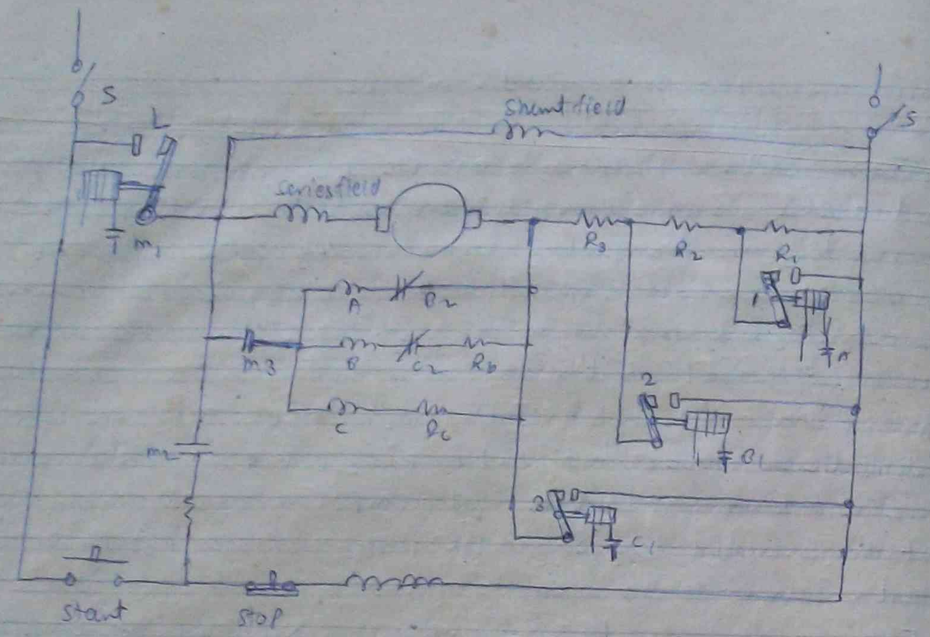


Fig 16-15

16.15 The counter emf magnetic controller

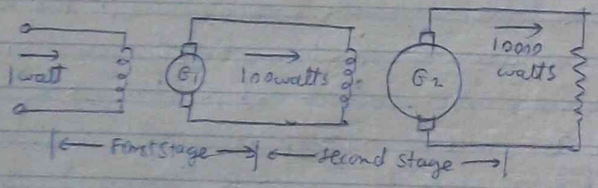
The magnetic controller with definite timing is not well suited to the starting of motors in applications where the starting torque requirement varies widely, when the starting load is usually severe, more time is required for acceleration between steps. In order to obtain the ideal current curves of Fig 16.6, each contactor must wait until the current has dropped to 1.25 times full load current before shorting the next section of armature resistance. Now as the motor speeds up, its counter emf increases and reduces the armature current, and for every value of armature current there is a definite and unique counter emf. Therefore the increasing counter emf may be used to trigger off the contactors instead of the decreasing current. Both method are in use.

Figure 16-16 shows the wiring diagram of a counter emf magnetic controller for a large shunt or compound motor, and Fig 16-5 shows the resulting armature current. To start the line switch S is closed and the start button is depressed. This completes the circuit through relay coil m, which closes its three contacts m_1, m_2 and m_3 starting the motor with R_1, R_2 and R_3 in series with the armature winding. When the counter emf of motor reached 50% of line voltage the voltage across coil A is just large enough to it to operate closing contact and shorting out R_1. When counter emf has reached 75% of line voltage, coil B operates, closing contact B_1 and opening contact B_2. Closing contact B_1 causes contactor No 2 to short out both R_1 and R_2. Opening B_2 de-energizes coil A and allows contactor No 1 to open. When the counter emf has reached 87.5% of the line voltage, coil C operates closing contact c_1 and opening contact c_2. This completes the starting operation. coil m and C remain energized as long as the motor is running, contact m_2 is not needed for starting but it is useful when stopping, because if it were omitted it would be necessary to keep the stop button depressed all the while the motor was slowing down to below the 50% of speed, as otherwise the counter emf of motor might operate coil m and start the motor up again. contact m_3 insures that R_1, R_2 and R_3 are cut back into the circuit as soon as the stop button is depressed so that if the operator tries to start the motor up again before it has dropped below 50% of speed it will not be thrown across the line with the starting resistance cut out.



— Relay contact normally open
— relay contact normally closed.

Direct current generator as a direct current power amplifier



Two stage power amplifier

Two amplidyne

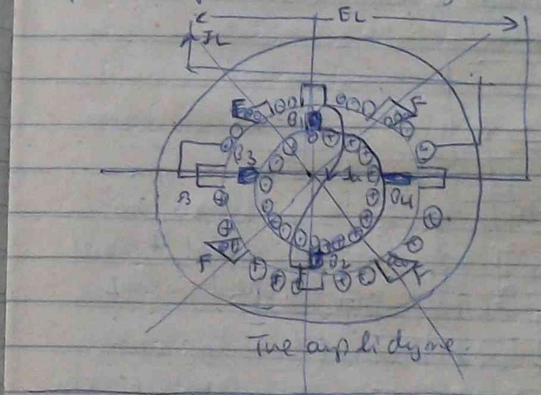
rotadyne - all armature reaction excited machines used in control work.

amplidyne - dc generator of special design that combines in one m/c greater ~~has~~ amplification than two stage amplifier.

This generator is driving a current of 100 amp through its load resistance R, its terminal voltage is 100 v. power required is 100 watt or 1% of rated output.

Φ_c produced in the poles $N_c S_c$ by the field current I_c in the field coils FF is indicated by dotted lines, flux of armature reaction Φ_a is in the full line. These two fluxes are at right angles to each other in armature and are approximately equal if the generator is delivering 100 amp at 100 volts.

R is gradually reduced zero while the field current is reduced so as to keep I_a constant at 100 amp. It will be found that when R is zero the field current required to circulate 100 amp through the short circuited armature only is only about 5% of field current required when terminal voltage is 100 v. Since the power input to field coil varies as the square of field current, the power input is now equal to 5% of 5% of 10 watt, 25 watt. Thus a field input of 25 watt results in the production of field Φ_a as powerful as the field produced directly by field input of 100 watts. Therefore if this flux can be used to generate a voltage to be applied to some external load will be 400 times, amplification of an ordinary dc generator and this means power amplification of 40,000



The amplidyne

current limiting connection, Amplidyne control

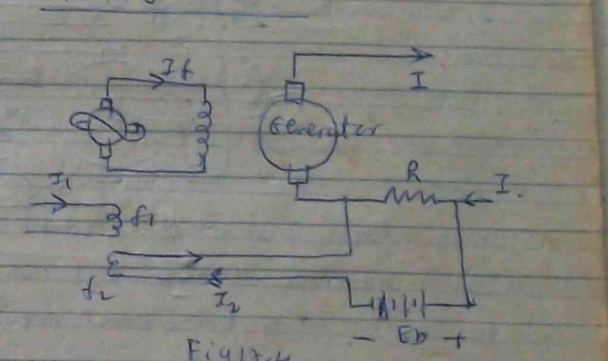


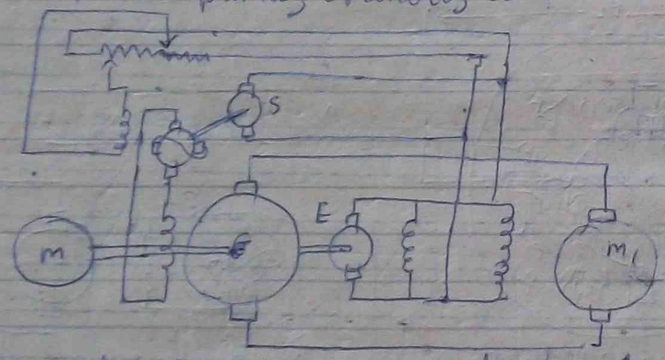
Fig 7.4

Fig 7.4 shows an amplidyne - excited dc generator equipped with a simple type of current limiting device. When the operator desires to increase the power output of generator, he increases the field current I_1 in the control winding f_1. This increases the voltage of amplidyne and so increases I_f and I_1, but as I passes through the value that makes IR equal to Eb, the current I_2 reverses, so that its mmf $in f_2$ now opposes the mmf of I_1 in f_1 and thus limits the current I. This current limiting called ~~feedback~~ feedback ckt, and as I R passes through equality with Eb the feedback changes from positive to negative. In practice, the circuit usually rather more

complicated and a third control field is often supplied by an antihunting circuit which still further stabilizes the operation. Protective relays or limit switches are often arranged to pass the right amount of current through one of the control field windings to reduce amplidyne voltage to zero.

Applications of the Amplidyne

When the amount of power to be controlled is small, the Amplidyne may be used as the main generator. For example, in Fig 14-6 the generator G might be an Amplidyne, and no other modification of this wiring diagram is required. However, since the amplidyne is generally provided with several control fields, some of these fields would probably be used to set current and speed limits or to make the operation partly or wholly automatic.



When the amount of power to be controlled is greater than 25 kw, the present practice is to use the amplidyne as a variable voltage exciter for the main generator, as in Fig 14-7. In that case a second exciter E, operating at constant voltage, is req'd. to provide a const. field for the motor M, to drive the amplidyne by means of the shunt motor S, and to provide the control field for amplidyne.

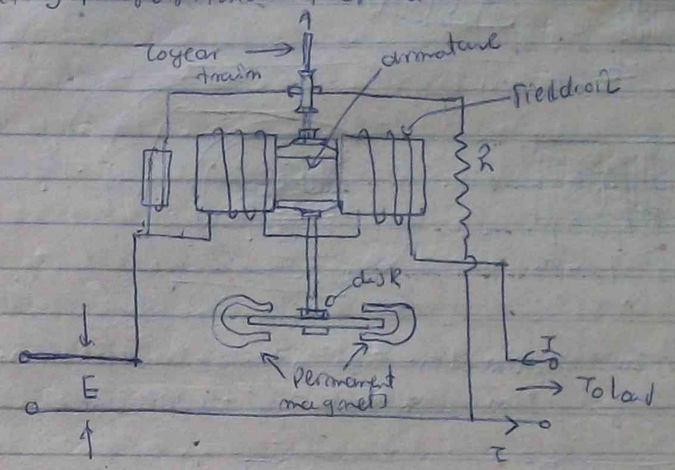
Direct current watt hour meter.

$$I_a = \frac{E - E_g}{R_a} \qquad T = u\phi I_a$$

I = line current I_a = armature current.

$\phi \propto I$.

If the dials are to record kwh correctly at all loads, the speed of the meter must be directly proportional to power, since driving torque is directly prop. to the power. It follows that a brake torque must be provided directly prop. to speed. This is accomplished by mounting a flat aluminium disk on the armature shaft and placing permanent magnets so that their flux is cut by the rotating disk as shown in Fig 19-5. The eddy currents produced in the disk are directly proportional to the speed and developed a brake torque directly proportional to speed.



Vibrating reed Type Freq. meter

This meter is small slow speed d.c motor complete with armature winding, commutator, and field coils as shown in fig 19-5 but containing no iron in its magnetic circuit. The rotating armature drives a chain of reducing gears and dials that record kwh consumed by load.

$$T = u\phi I_a, \qquad I_a = \frac{E - E_g}{R_a}$$

$\phi \propto I$

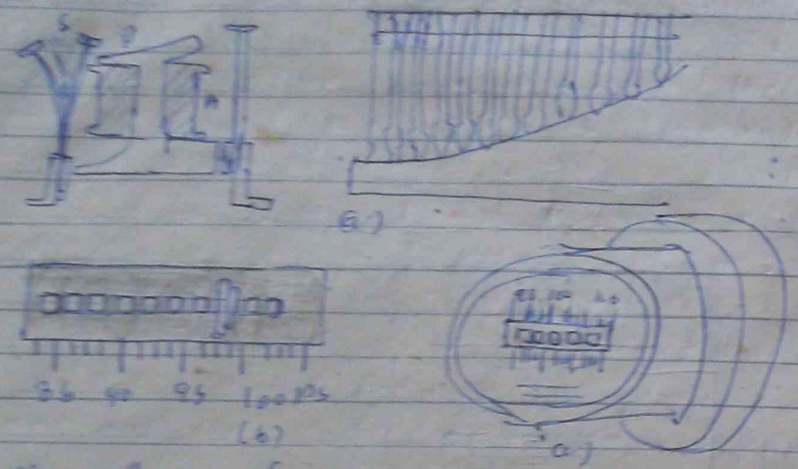
$\therefore T \propto EI \rightarrow$ Torque $\propto$ Power (in watts)

brake torque must be provided directly by prop. to speed. This is accomplished by mounting a flat disk on armature shaft.

Vibrating Type freq. meter

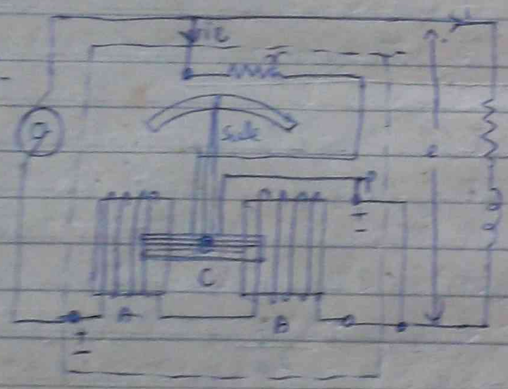
In this type of instrument a number of steel strips are fixed at one end as shown in fig 20-6. While the current whose freq. is to be determined is passed through coil A. The reeds are attracted twice in cycle by electro magnet B. that reed which has a natural freq. eq. to twice the freq. of current will be set in violent vibration. The reed shown in dots is shortened and appears

a suitable reading when vibrating. The exact appearance of such a curve is shown in Fig 20-6 (c)



Vibrating reed type frequency meters can be interlocked with a scale when frequency is in cycles (a) exciting coil.

The voltmeter



load current is passed through the current coil B and it produces a magnetic field, in the moving coil C mounted on jewelled bearings. The moving coil, in series with a high resistance is connected across the line in parallel to the load. The small current about 20 mA that passes through the moving coil C is proportional to voltage, is in phase since inductance of coil C is negligible compared with high resistance of coil connected in series with C.

Since the moving coil C is carrying current and is in a magnetic field, it is acted upon by forces that produce a torque tending to turn. Turning is opposed by spring action.

Turning torque $\propto$ I (moving coil) $\times$ strength of magnetic field.

Power constant (2c) anti-deflecting torque = constant restraining torque

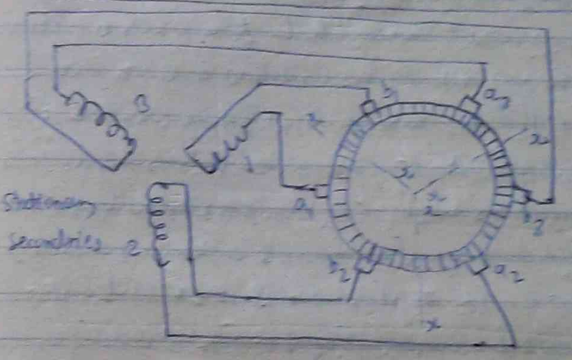
(Coil taken up in position)

Power pulsate (Pa) overcome able of deflecting = constant restraining

Torque pulsates torque torque,

watt meter calibrate, → by means of volt meter & amp meter,

Repulsion shifting Poly phase Induction motor



The demand for an adjustable-speed polyphase motor with good speed regulation and reasonably high efficiency at all speeds has led to the development of a commutated type of motor. The speed of such a motor may be adjusted by shifting the brushes.

The reason why the efficiency of the usual rotor motor is so low at low speed is that the rotor current is controlled by inserting resistance in the rotor circuit. The I^2R loss in this resistance can be avoided if the resistance is replaced by a counter emf to oppose the current. This counter emf must, of course, have the same frequency as the emf in the rotor bars and its magnitude must be adjustable. The generation and application of this counter emf are obtained as follows.

First, the rotor and stator windings are interchanged. That is, the primary is wound on the rotor and fed through the slip rings, while the secondary is wound on the stator. This does not change the operation of motor in any way. But it does mean that a rotating flux is set up by the primary winding, and which rotates at synchronous speed relative to that winding, rotates at slip speed relative to stationary object such as the secondary winding. For example, in a 60 cycle two pole motor operating with 5% slip, the rotor carrying the primary winding rotates at 57 revolutions per second while the flux produced by that primary winding rotates at 3 rps in the opposite direction. The freq. of the emf induced

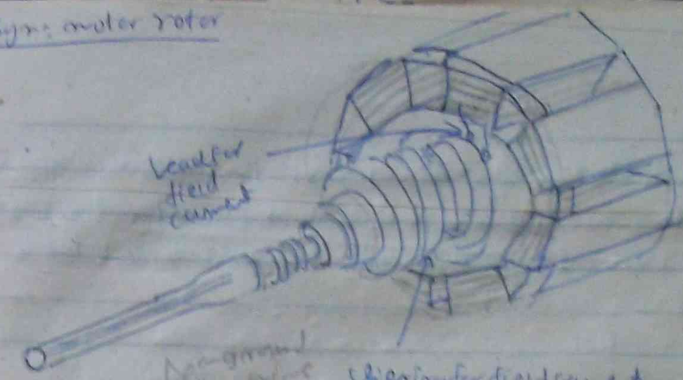
in the secondary winding on the stator is accordingly 3 cycles per sec.

A separate dc drum winding is placed in the same slots as the primary winding on rotor and is connected to commutator. Now if the rotor were running at synchronous speed, the field would be stationary and the voltage across a pair of brushes on the commutator would be direct current, but when there is any load on the motor the flux is slowly rotating, and the polarity of the voltage across the brushes reverses every time the flux turns through one-half a revolution. Thus the voltage across the brushes is alternating and its frequency is the same as that in the secondary winding on the stator.

Each phase of the secondary is connected to a pair of brushes on the commutator as shown in Fig 23-23. The brushes a_1, a_2, a_3 are carried on one rocker arm, and the brushes b_1, b_2, b_3 on another rocker arm. When the brush and set is concise with the brushes on the axis, then each pair of brushes $a_1 b_1$, $a_2 b_2$, $a_3 b_3$ is short circuited by a commutator bar and the motor runs as an ordinary wound rotor induction motor with rotor resistance cut out. But if the brushes are separated as in Fig 23-24, a counter emf is obtained from the commutator for each phase. This counter emf may be either positive or negative, depending upon which set of brushes is forward of clockwise. Thus a range of speeds above and below synchronous speed may be obtained and since the counter emf is practically independent of the load, the speed of the motor is reasonably independent of the load.

The brush shifting induction motor is more expensive than the wound rotor motor but its efficiency is higher at all speeds except synchronous speed and is very much higher at low speed. It is, of course, used only where adjustable speed is required as in hoisting machinery, stokers, printing machines, calenders etc.

Sync. motor rotor



Rotor of a synchronous motor.

Electric Lighting

Incandescent lamp → 2300 → 3000°C

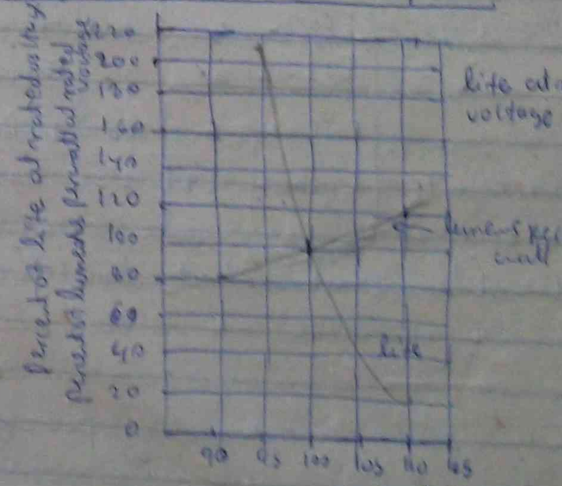
radiation baby → 6000°C.

1 ft radius interior surface sphere → 12.57 sq ft to 1 ft-c

produces 12.57 lumen

Candle of intensity 1 cp has total output of 12.57 lumens.

Tungsten Incandescent Lamps



Effect of Voltage Variation

Table 24-1

Tungsten filament Incandescent lamps

Size of lamp watt	Initial lumens	Initial lumen per watt	Filament temp. °C
25	200	10·4	2310
40	465	11·6	2435
50	660	13·2	
60	836	13·9	2500
75	1150	15·3	
100	1620	16·2	2580
150	2600	17·4	
200	3700	18·5	2610
300	5650	18·8	
500	9900	19·8	2670
750	15600	20·8	
1000	21500	21·5	2720
1500	33000	22·0	2755

because of the positive temp: coefficient of resistance, the tungsten lamp has a much lower resistance when cold than hot, so that when the lamp is switched on, the ~~that~~ initial current is much larger than the normal operating current.

Street series Tungsten lamps

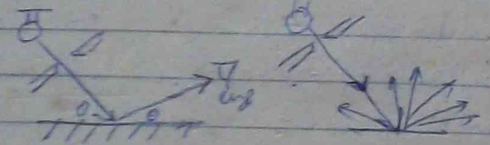
The principal difference between multiple and series lamps is that multiple lamps are designed for operation on constant voltage circuits and the series lamps on constant current circuits. For this reason, series lamps are made for a given current rating. AC series circuits have been standardized at 6.6 amp, and series lamps of low lumen rating are designed to burn either directly in the circuit or through one to one ratio transformers. The high lumen rating lamps are designed 15 and 20 amp filament currents and are generally operated through transformers of the proper ratio. Lamps of this type are made in size ranging from 2500 to 15000 lumens and are of the gas filled type.

Typical Hot cathode Rapid start Fluorescent lamps

Code No	Length ft	Lamp watt	Lumen output	
			coolwhite	warm white
F40/2	4	40	3100	
F48T12	4	60	3850	3900
F48PG17	4	110	6400	
F60T12	5	70	4500	
F72T12	6	85	5520	5620
F72PG17	6	160	10400	
F96PG17	8	215	15000	

Table 39-2

Reflection



reflection factor = $\frac{\text{light reflected}}{\text{light incident}}$

Lumen

$\text{Lumen} = \frac{\text{candle power}}{\text{Sq ft}}$

Candle power The candle power of a light source in any given direction is the measure of the intensity of the illumination that the standard candle produces in the horizontal direction.

Brightness and brightness Contrast

The candle power in any particular direction per square inch of projected area of light source.

Glare sufficient to interfere with vision or to cause unnecessary eye fatigue.

Ratio of eye fatigue is function of brightness of light source.

Coefficient of utilization - maintenance factor

The ratio of the ultimate maintained foot-candles on the working plane to the initial foot-candles

The lumen emitted by the lamps may be obtained from Table 39-1 and 39-2

Ex A room 25 by 36 ft is illuminated by 24 type F 60 T12 fluorescent lamps. The average illumination on the working plane as measured by a foot candle meter when the installation was new was found to be 50 ft-c. Calculate the coefficient of utilization.

Area of working plane = $25 \times 36 = 900$ sq ft.

Total lumens falling on this plane = $50 \times 900 = 45000$

Total lumens emitted by lamps = $24 \times 4500 = 108000$

Coefficient of utilization = $\frac{45000}{108000} = 0.42$

Types of lighting Installations

The distribution of the light emitted by lamps is usually controlled to some extent to some extent by means of reflectors and translucent diffusing screens, or even lenses, and it is often convenient to classify lighting installations in terms of the proportions of light directed upward and downward from the luminaires lighting units, or lighting fixtures, as they are variously called. Table 39-3 shows such a classification.

Table 39-3

Classification	Approximate distribution of the light output of luminaires percent	
	upward	downward
Direct	0 - 10	100 - 90
Semi direct	10 - 40	90 - 60
Direct - Indirect	40 - 60	60 - 40
Semi Indirect	60 - 90	40 - 10
Indirect	90 - 100	10 - 0

Direct lighting from relatively small area is characterized by high coefficients of utilization and a strong tendency to produce dark shadows and glare. Indirect lighting is characterized by low coefficients and an almost complete absence of both shadows and glare. As the designer varies the distribution of the light from direct to indirect, the quality and the cost of the lighting increase together, and the final design selected is often a compromise between cost and quality. It might be laid down as a general rule that direct lighting from suspended lighting units should never be used where a ceiling with a reflection factor of 50% or more is available. In such cases the cost of semi-direct lighting is only a little higher than the cost of direct lighting, and the quality of the illumination is greatly superior.

The use of luminous panels built into the ceiling requires special consideration. As the proportion of luminous panel area to total ceiling area is increased, the quality of the illumination, as regards freedom from glare and shadows, increases, and when the entire ceiling becomes one luminous panel we have the equivalent of indirect lighting. Even when the luminous panel occupies only 50% of ceiling area, the quality of the illumination may be as high as that obtained from semi-indirect suspended lighting units.

Room Ratio

The shape of a room affects the coefficients of utilization very materially. For example, if a room is very narrow and has a high ceiling, a substantial proportion of the light may fall on the walls and if they have a fairly low reflection factor, the coefficient of utilization may be quite low. In order to make use of the tables of measured values of coefficients of utilization, it is necessary to classify all rooms in regard to how favourable their shapes are for obtaining high utilization factors. The following empirical formula has been devised to perform this classification

$$\text{Room ratio} = \frac{W \times L}{H(W+L)}$$

where W = width of room, L = length of room.
H = height from working plane to light source if luminaires are direct or semi-indirect (if luminaries are indirect or semi-indirect, H is the height of ceiling above working plane)

Spacing of luminaires

In general, it costs considerably less to install a small number of large luminaires than to install a large number of small luminaries, to provide the same illumination on the working plane. For example, a luminaire that contains four fluorescent tubes does not cost twice as much as one of the same type that contains only two tubes. Moreover, the cost of wiring a room is roughly proportional to the number of outlets. Economy therefore requires that the number of rows of luminaires should be kept as low as possible, while still maintaining reasonably uniform illumination on the working plane.

In the case of indirect and semi-indirect luminaires, it is good practice to aim at a horizontal spacing between rows approximately equal to the height of the ceiling above the working plane, and in no case should the horizontal spacing exceed 1⅓ times this height.

In the case of direct and semi-indirect luminaires, it is good practice to aim at a horizontal spacing between rows approximately equal to the height of the ceiling above the working plane, depends to quite an extent on the candle power distribution curve of the luminaire. With fluorescent luminaires it is good practice to aim at a value of unity for this ratio and to set an upper limit of 1⅓. In the case of tungsten lamps combined with focusing reflectors as in unit 10, Table 39-4 the ratio of spacing to height should be about 0.6

In the case of fluorescent luminaires, it is common practice to join two or more luminaires end to end so that they can share a common outlet. In fact it often works out well to use continuous rows of luminaires, especially when the specified illumination is fairly high.

Suspension of luminaires

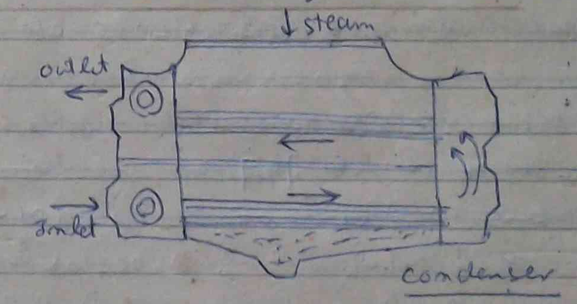
On the ceiling is an undoubtedly uniform. This is not a serious defect, because the ceiling is not a working plane.

2nd Year E.T.E.C

Generation Transmission & Distribution of Electrical Power

([illegible])

[illegible]


steam
outlet
inlet
condenser
cooling water out let
condensate

[illegible] Condenser [illegible] 10% [illegible]

[illegible]

၈.၂.၆.၁ [illegible] Boiler & furnace loss

[illegible] Economiser [illegible] Air preheater [illegible]

[illegible]

၈.၂.၆.၂ [illegible] 31% [illegible] steam turbine [illegible] thermal dynamic efficiency [illegible] 33% [illegible] Turbine [illegible] Gland and Bearing losses, Inlet & Inter stage outlet [illegible] steam friction loss [illegible] Turbine loss [illegible] turbine [illegible] turbine [illegible] Impulse turbine [illegible] turbine [illegible] reaction turbine [illegible]

၈.၂.၆.၃ [illegible]

[illegible] Alternator [illegible] Transformer [illegible] Asbestos lagging [illegible]

၈.၂.၆.၄ [illegible]

[illegible] Turbo alternator [illegible] transformer [illegible] 1-6% [illegible] Alternator [illegible] Transformer [illegible] alternator [illegible] Transformer [illegible] alternator, Transformer [illegible]

၈.၂.၆.၅ [illegible] ၃၀

[illegible] overall efficiency ([illegible]) [illegible] High pressure High temperature steam [illegible] pressure [illegible] temperature [illegible]

၄ [illegible] [illegible]

$C = 9000 + 1.25\,ukwh$

$W = 64900 + 124\,ukwh$ [illegible]

[illegible] 200,000 ukwh [illegible] 17000 Btu/lb [illegible]

[illegible] $C = 9000 + 1.25\,ukwh$

$= 9000 + 1.25 \times 200000$

$= 259000\,lb$

[illegible] $= 13000\,Btu/lb$

[illegible] $= 259000 \times 13000$

$= 3367000000\,Btu$

[illegible] $200000\,ukwh$

[illegible] $= 200000 \times 3412\,Btu$

$\eta_{overall} = \dfrac{[illegible]}{[illegible]} \times 100$

$= \dfrac{200000 \times 3412}{3367000000} \times 100\%$

$= 20.3\%$

၄ [illegible] ၃ [illegible] W C [illegible] ukwh [illegible] $66000 + 110\,ukwh$

(၁) $C = 12000 + 1.25\,ukwh$ [illegible] stand by [illegible]

$$\frac{66000 + 104\,ukwh}{12000 + 1.25\,ukwh} = 8$$

$66000 + 104\,ukwh$

$\pm 96000 \pm 10\,ukwh$

-3000 [illegible]

$\frac{W}{C} = 8 - \frac{3000}{12000 + 1.25\,ukwh}$

[illegible]

$\frac{W}{C} = 8$ [illegible]

$\frac{W}{C} = 8$

[illegible]

$C = 12000 + 1.25\,ukwh$

[illegible]

$C = 12000 + 1.25 \times 0 \rightarrow C = 12000$

[illegible] stand by [illegible] $= 12000\,lb$

$= \frac{12000}{8}\,lb$

$= 1500\,lb$

[illegible]

$W = 70000 + 13.5\,kwh$ [illegible]

[illegible]

$c = 3000 + 1.5\,kwh = 3000 + 1.5 \times 190000$

$= 303000\ lb$

[illegible] $= 3646\ 000\ 000$ Btu

Equivalent elect energy $= \frac{3646\ 000000}{3412} = 1023236$ kwh

[illegible] $= 200000$ kwh

$\eta_{oa} = \frac{200000 \times 100}{1023236} = 18.47\%$

$W = 70000 \times 13.5\,kwh$ — (1)

$kwh = \frac{W - 70000}{13.5}$

$c = 3000 + 1.5\,kwh$ — (2)

$c = 3000 + 1.5\left[\frac{W - 70000}{13.5}\right]$

$9c = 27000 + W - 70000$

$9c = W - 43000 \rightarrow c = \frac{W - 43000}{9}$ — (3)

[illegible] $c = 3000\ lb$

[illegible] $c = \frac{2 + 1000}{?} = 222.2$ lb boiler

$3000 - 222.2 = 2777.8$ [illegible] lb Engine turn loss

[illegible] 168 [illegible] 1.44 lb/kwh [illegible] Btu/lb

[illegible] $= 403200$ kwh

[illegible] $= 403200$ kwh

[illegible] $= 2440$ [illegible]

[illegible] $= 2440 \times 2440 \times$ [illegible] Btu

[illegible] $= \frac{2440 \times \ldots}{3412}$

$= 14222508$

$\eta_{oa} = \frac{403200 \times 100}{14222508} = 20.47\%$

[illegible]

[illegible] $= 1$ kwh

[illegible] $= 1.44$ lb

[illegible] $= 1.44 \times 12000$ Btu

[illegible] $= \frac{1.44 \times 12000}{3412}$ kwh

$= 7.006$ kwh

$\eta_{oa} = \frac{1 \times 100}{7.006} = 14.94$

[illegible]

[illegible]

[illegible] Scotch Boiler Lancashire Boiler [illegible] Boiler [illegible] efficiency [illegible] water tube Boiler [illegible]

[illegible] Pressure [illegible] temperature [illegible] water tube

Boiler [illegible]

[illegible] water tube Boiler [illegible] Boiler [illegible] Boiler [illegible] water tube Boiler [illegible] 20000 [illegible] 1000°F, Pressure 2520 lb/sq in [illegible]

[illegible]

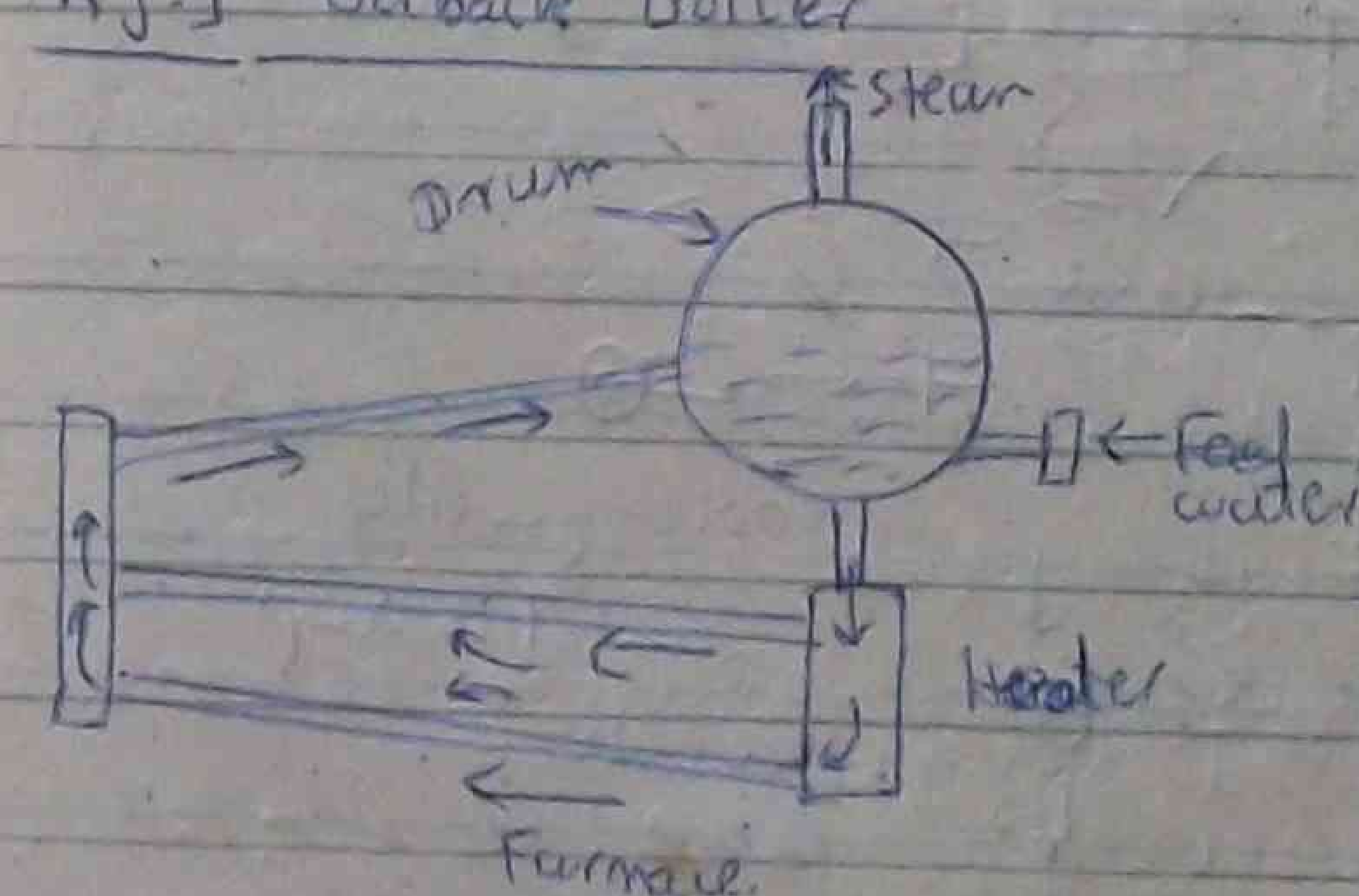
[illegible] Boiler [illegible] Boiler [illegible]

[illegible]

[illegible] super heater [illegible]	[illegible]

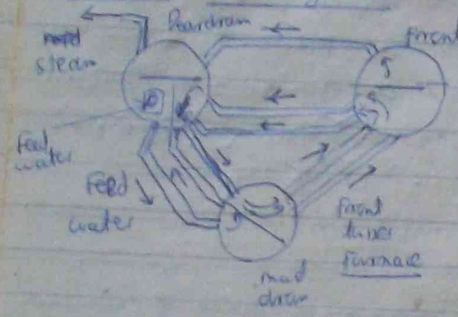
Babcock boiler [illegible] stirling boiler [illegible]

Babcock Boiler



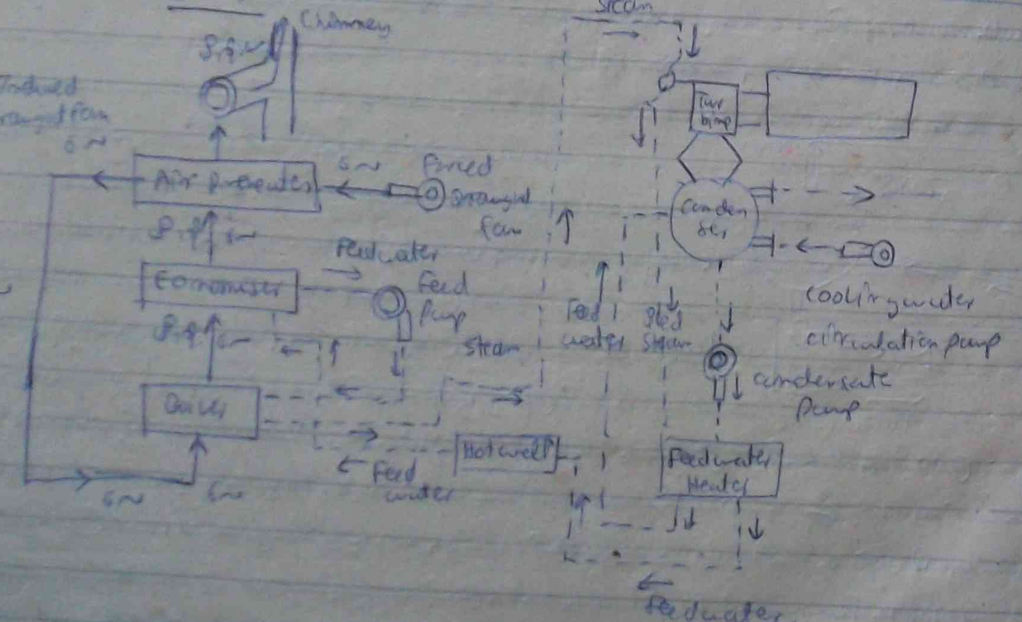
Babcock boiler [illegible] drum [illegible] Header [illegible] Header [illegible] drum [illegible] Header [illegible] drum [illegible] drum [illegible] Furnace [illegible]

૬-૪-૨ Stirling Boiler



આ બોઈલરમાં ત્રણ ડ્રમ હોય છે. જેમાં ઉપરનું ડ્રમ Hardrum કહેવાય છે. જ્યારે નીચેના બે ડ્રમ Front drum અને Rear drum કહેવાય છે. આ બોઈલરમાં Front drum અને Rear drum ને જોડતી ટ્યુબ્સ Front tube કહેવાય છે. Hardrum અને Front drum ને જોડતી ટ્યુબ્સ Steel tubes કહેવાય છે. Rear drum ને Mud drum સાથે જોડતી ટ્યુબ્સ Furnace tube કહેવાય છે. આ બોઈલરમાં ફીડ વોટર Front drum માં પ્રવેશે છે. ત્યારબાદ Front drum માંથી Front tube દ્વારા Rear drum માં પ્રવેશે છે. Rear drum માંથી Furnace tube દ્વારા Mud drum માં પ્રવેશે છે. Mud drum માંથી ફીડ વોટર Front tube દ્વારા Front drum માં પ્રવેશે છે. Front drum માંથી ફીડ વોટર Steel tubes દ્વારા Hardrum માં પ્રવેશે છે. Hardrum માંથી ફીડ વોટર Hot steam તરીકે બહાર નીકળે છે.

૬-૪-૩ કોલસા આધારિત વરાળ ઉત્પાદન એકમ



૬-૪-૪ કન્ડેન્સર આધારિત વરાળ ઉત્પાદન એકમ

આ પ્રકારના વરાળ ઉત્પાદન એકમમાં વરાળ ઉત્પાદન ઊંચા pressure અને temperature એ થાય છે. આ પ્રકારના વરાળ ઉત્પાદન એકમમાં Boiler ની સાથે Superheater નો ઉપયોગ કરવામાં આવે છે. Superheater નો ઉપયોગ કરવાથી ઊંચા pressure અને temperature વાળી વરાળ મેળવી શકાય છે. આ પ્રકારના વરાળ ઉત્પાદન એકમમાં 250 lb/hour at steam pressure, 1000°F temperature, 30 million lb/hour at steam pressure અને 2500 lb/sq.inch pressure, 1000°F temperature વાળી Superheated steam મેળવી શકાય છે. આ પ્રકારના વરાળ ઉત્પાદન એકમમાં Boiler Room અને Engine room અલગ અલગ હોય છે. Turbine ના Rotor Blade ને High pressure stage, Intermediate pressure stage અને Low pressure stage એમ ત્રણ ભાગમાં વહેંચવામાં આવે છે. Turbine ના High pressure stage માંથી વરાળ બહાર નીકળ્યા બાદ તેને ફરીથી Boiler Room માં લાવવામાં આવે છે. જ્યાં તેને Reheater વડે ફરીથી temperature વધારવામાં આવે છે. ત્યારબાદ આ વરાળને Boiler Room માંથી Turbine ના Intermediate pressure stage અને Low pressure stage માં મોકલવામાં આવે છે. Turbine ના Low pressure stage માંથી 1 to 2 psi pressure અને 100°F temperature વાળી વરાળ બહાર નીકળે છે. આ વરાળને condenser માં ઠંડી પાડવામાં આવે છે. ત્યારબાદ આ પાણીને Feed water તરીકે ઉપયોગમાં લેવામાં આવે છે. આ પ્રકારના વરાળ ઉત્પાદન એકમમાં Turbine માંથી બહાર નીકળતી વરાળને condenser માં ઠંડી પાડવા માટે circulating cooling water pipes નો ઉપયોગ કરવામાં આવે છે. આ પાઈપ્સમાં ઠંડું પાણી વહેતું હોય છે. જે વરાળનું latent heat લઈ લે છે. જેથી વરાળ પાણીમાં રૂપાંતર પામે છે. આ પાણીને condenser માંથી બહાર કાઢવામાં આવે છે.

૬-૪-૪-૧ condensate (કન્ડેન્સેટ)

condenser માંથી બહાર નીકળતા પાણીને condensate કહેવામાં આવે છે. condensate ને condensate pump દ્વારા Feedwater heater માં મોકલવામાં આવે છે. Feedwater heater માં condensate ની સાથે Turbine ના High pressure stage માંથી બહાર નીકળતી વરાળ પણ મોકલવામાં આવે છે. જેથી condensate ને Latent heat મળે છે. Turbine ના High pressure stage માંથી બહાર નીકળતી વરાળ condenser માં ઠંડી પાડવામાં આવે છે. જેથી condenser માં ઠંડું પાણી વહેતું હોય છે. જે વરાળનું latent heat લઈ લે છે. જેથી વરાળ પાણીમાં રૂપાંતર પામે છે. આ પાણીને condenser માંથી બહાર કાઢવામાં આવે છે.

Feedwater heater માંથી બહાર નીકળતું પાણી Hotwell માં જમા થાય છે. Hotwell માંથી પાણી Economiser માં પ્રવેશે છે. Economiser માં પ્રવેશતું પાણી ઊંચા pressure અને temperature વાળી વરાળ બનીને Boiler માંથી બહાર નીકળે છે.

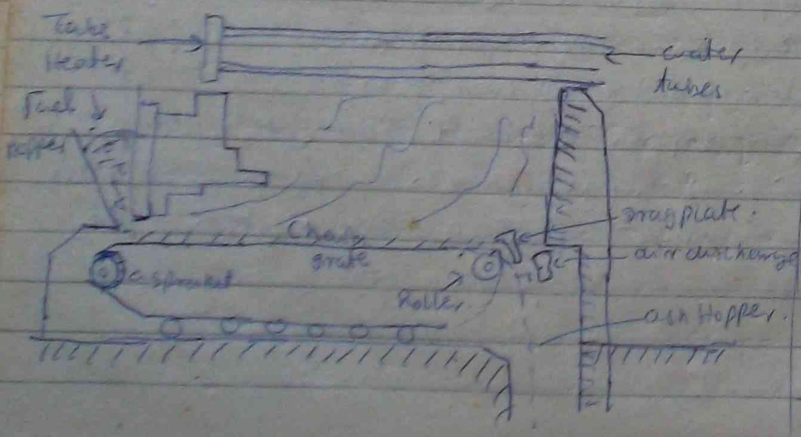
Exhaust air and flue gases [Exhaust air and flue gases]

Induced Draught fan, Balanced Draught system, Forced Draught fan, Induced Draught fan, Complete combustion, Air preheater, Economiser, Boiler tubes, Superheated tubes, Economiser, Air preheater, Induced Draught fan, Chimney

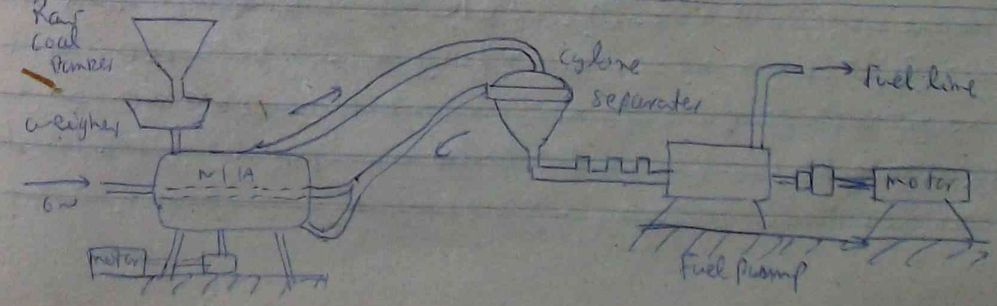
Cooling water [Cooling water]

Condenser, Cooling tower, Exhaust steam, Cooling tubes, Condenser, Latent heat, Condenser, Cooling tower

m-J-5 Mechanical Stoker (યાંત્રિક સ્ટોકર)

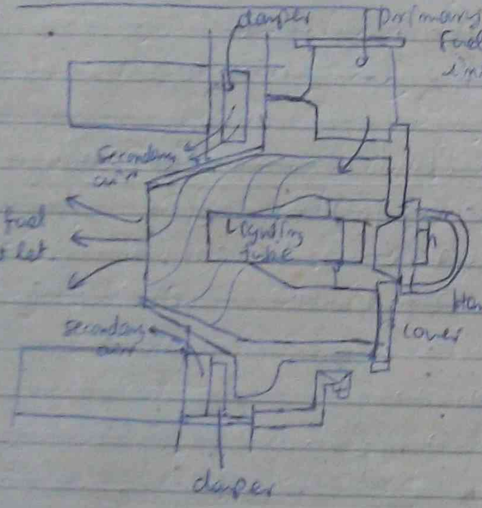


m-J-6 Pulverised Fuel Plant (પલ્વરાઈઝ્ડ ફ્યુઅલ પ્લાન્ટ)



combustion chamber of the boiler. The coal is pulverised in a coal pulverising mill. The pulverised coal is then carried by a current of air to the burners which inject the coal into the furnace. The air supplied to the burners is called primary air. The remaining air required for complete combustion is supplied separately and is called secondary air. The primary air is heated by the flue gases in an air heater. The secondary air is heated by the hot gases coming from the furnace. The flue gases coming out from the boiler are passed through a cyclone separator where the fine particles of coal are separated from the flue gases. The flue gases are then passed through the economiser and air heater before they are exhausted to the atmosphere through the chimney.

Pulverised Fuel Burner



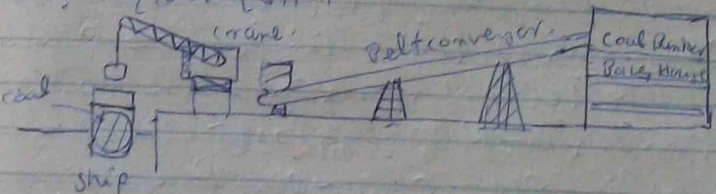
The pulverised fuel burner is designed to burn the pulverised fuel efficiently. The pulverised fuel is carried to the burner by the primary air which is preheated before it enters the burner. The secondary air is also heated before it enters the burner. The primary air and secondary air are supplied to the burner through separate passages. The primary air and pulverised fuel mixture is supplied through a nozzle. The secondary air is supplied through an annular passage surrounding the nozzle. The secondary air is supplied in such a way that it creates a swirling motion to the mixture of primary air and pulverised fuel. The swirling motion of the secondary air ensures complete combustion of the pulverised fuel. The burner is designed to withstand the high temperature of the furnace. The burner is provided with a cooling arrangement to prevent the burner from overheating.

Boiler House Equipments

1. Coal handling gear - to transport coal from the storage yard to the boiler house.
2. Economiser - to heat the feed water.
3. Air preheater - to heat the air.
4. Ash handling equipment - to remove the ash.
5. water walls - to absorb heat.
6. condenser - to condense the steam.
7. superheater - to superheat the steam.

Coal Handling gear

The coal handling gear is used to transport the coal from the storage yard to the boiler house. The coal is transported by a travelling crane or by a belt conveyor. The belt conveyor is used to transport the coal at a speed of 200 ft/min. The coal is then transported to the boiler house by a bucket conveyor or by a belt conveyor. The coal is then transported to the boiler house by a gravity feed. The coal is then pulverised by a pulverised fuel mill.



The coal is then transported to the boiler house by a belt conveyor. The coal is then transported to the boiler house by a bucket conveyor. The coal is then transported to the boiler house by a gravity feed. The coal is then pulverised by a pulverised fuel mill.

Economiser (or) Feed water heater

Air preheater (or) Blower

Air Handling Equipment (or) Blower

1st year ETEC Syllabus for Preliminary classes & 2nd civil E Tech 2nd maths

Arithmetic syllabus for preliminary class

Time — 2hr/week on 30 weeks

Basic

Arithmetic

(1) measurement of length, weight, and Time, metric system, British system (1wr)

(2) Vulgar fractions — simplification

(3) Decimals fractions Addition, Subtraction, multiplication, Division of Decimals, Roots of Numerical values — (2wr)

(4) Indices and Power (Basic foundation for log) (3hr)

(5) Test — (1wr)

(6) Average s — (1wr)

(7) Practice (simple and compound) — (2wr)

(8) Ratio and proportion (simple/compound) (4wr)

(9) Unitary method — (4hr)

(10) Percentage — (2wr)

(11) Profit and loss — (2 hr)

Mid Term Exam

(12) mixtures — (2 hr)

(13) Pb: on time and work (2+1)

(14) Phon supply pipes (2 hr)

(15) Pb: on time and distance (2+1)

(16) Test

(17) logarithm
Determination of Characteristic
Mantissa Antilogarithms
Application of log (9)

(18) mensuration Area of Rectangle And Triangle
Area of Parallelogram —
Area of regular polygon and Rhombus (3+1)
Quadrilaterals
circum ference and Area

Revision 1wr Total 60wr

Geometry

object — cover the H.S.C syll: syllabus of Preliminary class

	description	Hr
(1)	Theorm ① → ③ with exple worked out	— 1
(2)	Theorm 4–6 and Pb on Ex 3	— 2
(3)	Theorm 7 and cor 1, 2, 3	— 1
(4)	Pb: on 6 x 4	— 1
(5)	Theorm 8 – 8a and cor 1 2 3	— 1
(6)	Pb on Ex 5	— 1
(7)	Theorm 9 – 10 with work out Pb: in class room	— 1
(8)	Pb: on Ex 6, 7	— 1
(9)	theorm 11 cor 1, 2, Theorm 12 cor 1	— 1
(10)	Pb: on Ex 8	— 1
(11)	Theorm 13 Pb on Ex 9	— 1
(12)	Theorm 14–14a and summary condition set congruency of △	
(13)	Pb: on Ex 10	
(14)	1st test	
	Theorm 15, 16, 17 simple construction Pb 1–3 (1) 4:4c	
	Theorm 18 — 21 Pb: on Ex 14	
	Theorm 22 — 23 1a 11 24 cor Pb 5	
	Pb: on Ex 15	
	construction of Quadrilateral case 1 → 6	
	Pb: on Ex 16	
	Theorm 25 with that example	
	Pb: on Ex 17	
	Theorm 26 and cor 1, 2, 3	
	Tm: Pb: on Ex 18	
	Mid	
	Theorm 27 cor 1 2 3	
	Pb: on Ex 19	
	Theorm 28 Pb: on Ex 20	
	Theorm 29 → 30 Pb: on Ex 24	

simple loci and Ex: 1→6

...31→32 Pb:- on Ex 27
Ca—32c and Pb:- on Ex 28

...inition and properties of
Theorm 33 ... Cor 1 2 3
Pb:- on Ex 30
Theorm 34 cor 1, 2, 3 +
Pb:- on Ex 31

2nd Test

Theorm 35 - 36a Pb on Ex 32
" 37 - 38 Theorm (iii) 23)
" 39 - 41
" 42 - 43
Pb:- on Ex 33

Theorm 44 - 45 and Pb:- on Ex 34
Theorm 46 - 46(a) and cor 1, 2, 3
Pb:- 2, Theorm 47 - 48 and cor
Pb:- on Ex 35
Theorm 49
Pb:- on Ex 36

60hr

Algebra

Simple equation - Explanation and to illustrate the diff: method of solution, Axioms used for the solution of simple equations, General rule for solving simple equations

(1) Pb:- on simple eq:
(2) symbolical expression
(3) Pb:- leading to simple eq:- (8hr)
(4) simultaneous eq:- - Explanation of the definition and to illustrate the method of solution
(5) Pb:- on simultaneous ~~Eq~~ eq:
(6) Pb:- leading to simul: eq: (8hr)
(7) simple Quadratic eq:- Explanation of def:- and to illustrate diff: method of sol:

Ctd...

(8) Pb:- on Quadratic eq:
(9) Pb:- leading to quadratic eq:- (10)
(11) Harder multiplication and division (5hr)
(12) on factorisation (2hr)
(13) HCF and LCM Explanation of def:- Examples on HCF and LCM (4hr)
(14) Pb:- on HCF and L.C.M — (4hr)
(15) Pb:- on fraction — (4hr)
(16) Identities and transformations — Explanation of def:
(elementary portion)
(17) Pb:- on identities — (5hr)
(18) Ratio, Proportion and variation — Explanation of def:- and to illustrate some ex:
(19) Pb:- ratio, proportion, variation (5hr)
(20) Graph — Rectangular co-ordinate use of squared paper and method of plotting points. Application of graph to solve technical problems. General solution of linear and quadratic graphs (6hr)
(21) To hold two class tests and general revision on subject (5hr)

Physics

(1) unit of measurement
mus c.g.s FPS
weight mass scalar vector (3hr)
(2) motion - Displacement
velocity speed, acceleration, retardation - uniform acc:
aim: give to graphs application on following formulae
$v = u + ft$
$s = ut + \frac{1}{2}ft^2$
$v^2 = u^2 + 2fs$ (6hr)

Newton's laws of motion and units of force such as gram wt pound wt pondal dyne

Composition and resolution of the force by graphical method principle of balance and moment (10hr)

(1) Definition of work, power and Energy with simple calculation (3hr)

(2) Density of a solid and liquid relative density pressure in liquid Archimedes Principle. Atmospheric Pr: and construction of a simple barometer. (5hr)

(3) Heat and temp: construction of thermometers conversion of thermometer scale Expansion of solid due to heat linear expansion and simple coefficient — (3hr)

Chemistry

(1) Introduction — Def: atom molecule matter element mixture compound structure of atom (2hr)

(2) Fe symbol, formula, valency equation (4hr)

(3) Chemical equivalent or equivalent weight Def: of acids bases and Salts — (3hr)

(4) Laws of chemical combination — Conservation of matters, constant Proportion, multiple proportion Gaseous volumes PB (4hr)

(5) Test

(6) Dalton's Atomic Theory and Avogadro's Hypothesis (3hr)

(7) Atomic and molecular weight Relation bet: eq: weight Valency and Atomic weight) Dulong and Petit's Law Pb (4hr)

(8) Study of element and their compound H_2, O_2, NH_3, CO_2, Limestone (6hr)

(9) water (Hard, soft salt) (3hr)

A Text Book of Inorganic Chem: by L Mitra.

2nd Year mathematics

(1) Simultaneous Quadratic Eq: and surds (10hr)

(2) Ex: on Simultaneous Quadratic Equation

(3) Meaning of surds and Ex

(4) Variation — (4hr)

(a) Direct variation (b) Inverse variation (c) Joint variation

(5) Arithmetical Progression — (5hr)

(a) Meaning of AP (b) common diff: (c) Example

(6) Geometrical Progression — (10hr)

(a) Meaning (b) common diff: (c) Examples

(d) Further application of (e) method of allocating allowance for Depreciation (1st, 2nd, 3rd method)

(7) Co-ordinates — (10hr)

(a) Representation eg: by graph (b) Sol: of Simultaneous eq: Graphically (c) Determination of Area

Applied mechanics for 1st year

two hr/week, 60hr (total)

1. Introduction (2hr)
def: of force, kinds of forces, body rest, statics, Dynamics, tension compression, reaction, equilibrium composition and resolution of forces resultant parallelogram of force

2. Pb: on resultant — (2hr)
$R^2 = P^2 + Q^2 + 2PQ\cos\theta$
To resolve a force into two components at right angle to one another
$F\sin\theta$ $F\cos\theta$ simple Ex. and Classwork.

3. △ of forces — (5hr)
Lami's theorm, Proof examples and Pb

4. Polygon of forces — (4hr)
Pb: on finding resultant for any no: of forces, to and from any direction acting on body

5. ∥l forces, like and unlike parallel forces — (2hr)

6. moment
Principle of moment and Pb: (4hr)

7. couple (1hr)

8. General condition of equilibrium of co planar forces (2hr)

9. Centre of gravity
weights and areas — (4hr)

10. work power energy Pb (6hr)

11. Machine, mech: advantages
lever & pulleys (2hr)

12. Inclined plane (3hr)

13. friction, laws of friction (4hr)

~~14. Test~~

14. Test → 1hr

15. motion velocity — (3hr)
kinds of velocity, Acceleration, kinds of acceleration, velocity and speed:, angular velocity, relative velocity

16. Angular velocity (3hr)
centrifugal force and centripetal force

17. Derivation of standards (4hr)
kinematic eq: for linear and angular motion with Pb
$v = u + at$
$s = ut + \frac{1}{2}at^2$
$v^2 = u^2 + 2as$

18. motion under gravity (2hr)

19. motion down a smooth inclined plane (1hr)

20. momentum relation $f = ma$ (1hr)

21. motion on a rough plane
Steel on steel, cast iron (2hr)

22. Test (1hr)

Revision

E.T.E.C mathematics (1st year) Comgg: maths

mensuration, Algebra, Trigo

mensuration (one paper)

Ref: (1) mensuration for Indian schools and colleges by P. Pointz
(2) mathematics for Engineers
Da series.

Algebra (one paper)

① Approximation (4 hr)
(a) Suggested method for Approximation
(b) Approximation for squares and sq: roots (4 hr)

② Indices (5 hr)
(a) $\sqrt{a} = a^{1/2}$
(b) $a^0 = 1$
(c) $a^m \times a^n = a^{m+n}$
(d) $\frac{a^m}{a^n} = a^{m-n}$
(e) $a^{p/q} = \sqrt[q]{a^p}$
(f) $\frac{1}{a^m} = a^{-m}$

③ Logarithms — (6 hr)
(a) $a^x = 0$, $x = \log_a 0$
(b) uses of log: tables
(c) $\log(A \times B) = \log A + \log B$
(d) $\log A/B = \log A - \log B$

④ Simple Equations — (5 hr)
Rules for transportation of terms and factors

⑤ Simultaneous eq: — (5 hr)
Er: on Sol: of simultaneous eq:

⑥ Quadratic eq: (6 hr)
(a) Sol: of Quadratic eq: by factorisation
(b) Sol: of Quadratic eq: by completion of sq:
(c) Sol: of Quadratic eq: by use of formulae

Trigonometry (30 hr)

① Trigonometric Ratio (10 hr)
(a) Six trigo ratio and relation bet: them
(b) Uses of trigonometric tables
(c) application of trigonometric ratios
(d) Angle of any magnitude

② Solution of Triangles (6 hr)
(a) sine Rule
(b) cosine Rule

③ The addition formulae (10 hr)
(a) $\sin(A+B) = \sin A\cos B + \cos A \sin B$
(b) " (-) = " - "
(c) $\cos(A+B) = \cos A\cos B - \sin A\sin B$
(d) " (-) = " + "
(e) $\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$
(f) $\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$

(g) $\sin 2A = 2\sin A \cos A$
(h) $\cos 2A = \cos^2 A - \sin^2 A$
(i) $\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$

Introduction to graphs (5 hr)
(i) Obj:- & use of graphs
(ii) simple plotting.

Physics for First year

Heat — (23 hr)

① Thermometer — 2 hr
Heat and temperature, Distinction bet: heat and temperature, measurement of temperature, construction of mercury thermometer, Determination of fixed points on thermometer, Fahrenheit and centigrade scales and relations between them Pb

② calorimeter — (8 hr)
Units of heat, Relation between calories and Jths, specific heat

Thermal capacity. water equivalent
latent heat of fusion
latent heat of vaporisation Pb:-

③ Expansions of solids (3 hr)
linear, superficial and cubical expansion of solids, coefficient of linear, superficial and cubical expansion of a solid Relation between them pb.

④ Expansion of Liquids (2 hr)
coefficient of real and apparent expansion of liquids. Relation between them. pb.

⑤ Expansion of Gases (6 hr)
coefficient of expansion of gas
Charles' law. pressure at a point in liquid. Boyle's law. Absolute zero and absolute scale.
Combination of Charles' law and Boyles' law pb:-

⑥ Test ——— (1 hr)

⑦ Transmission of heat (4 hr)
3 models of transmission of heat
Distinction bet: conduction, convection and radiation.

⑧ mechanical equivalent of heat (4 hr)
Relation between heat and work. first law of thermo dynamics.
Determination of mech: eq: of heat
Pb

Magnetism (9 hr)

① magnet and magnetic Induction (2 hr)
Natural magnets, Artificial magnets
North and seat South Poles, magnetic substance, magnetic Induction, method of magnetisation, Diff: bet: a magnet and magnetic substance. Destruction of magnetism magnetic properties of iron and steel.

② magnetic field and lines of force (5 hr)
magnetic field, magnetic lines of force. properties of lines of force
maps of magnetic field. (North pole pointing north and North pole pointing south.) Neutral pt:. law of magnetic force. unit pole. Strength.

of mag: field. Pb:

(A) Static Electricity (10 hr)

① Electro static Induction (1 hr)
Two kinds of electrification (+, -)
conductors and Insulators. Electroscope
Electrification by induction.

② law of electric force: Electric potential (4 hr)

(a) coulomb law of force, unit of charge. Electro static field of force; Intensity of field at a point. Electro static unit of intensity. Electric lines of force Pb

(b) Electric potential
The analogy bet: temp: and potential
+, -ive, zero potential. Potential of a conductor, unit of potential. potential at a point due to charge. Potential inside a hollow conductor Pb

③ Capacity: condensers (4 hr)
(a) capacity units of capacity. capacity of spherical conductor. factors determining the cap: of conductor.
Sharing of charges bet: two conductors
Pb

(b) condensers
Principle of condenser, ∥l plate condenser. grouping of condenser. (in ∥l and in series) Dielectric constant Pb

④ Test ——— (1 hr)

(B) Current Electricity (16 hr)

(1) Preliminary consideration — (2 hr)
Simple idea of electric current and strength ($I = Q/t$) condition

Union of Burma

necessary for continuous flow of electricity. Types of Primary cells (the Le clanche' cell and Daniell cell)

(2) ohm's law and its application (9hrs)

ohm's law, Resistance, law of resist:, Application of ohm law Resistance connected in series and Parallel. Grouping of cells (series, parallel, and mixed grouping) Problems

(3) magnetic effect of current (2hr)

Oersted's experiment Diff: rules for ascertaining the direction of current. Electro magnetic Induction

(4) Heating effect of current (2hr)

work done by a current, Joule's law Power of an electric ckt:, Pb.

(5) Chemical effect of current (1hr)

faraday's laws of electrolysis Secondary cells (The storage cells) Pb

Prescribed Textbook - A Text Book of Intermediate physics by J.N Sen and N.R Das Gupta

Ref: - Intermediate phy: by S.C Roy & Choudhury and D.P Sinha.

Electro Technology

for 2nd year civil Engg:)

(1) fundamental units of force, torque work, energy, Power, coulomb, amp: volt, ohm, henry farad, amp turn weber, lumen, candle Power, foot candle ——— (1hr)

(2) Heating effects of electric current — (1hr)

(3) magnetic effects of electric current

(4) Insulating materials, conductors and cables —— (2hr)

(5) Resist: in series, ||l (2hr)

(6) specific resist: — (1hr)

(7) Temp: coeff: of resist: — (1hr)

(8) ohm's law and Kirchoff's law (2hr)

(9) Electric wiring

systems of wiring, bare conductor systems, insulated conductor system mechanically protected insulated conductor system, cleat wiring, wood casing, metal sheated system, conduit system. Dust systems, Armoured cable system, Bonding. earthing, cable tranking, catenary, voltage limitation, wiring rules and regulations special installation for hazardous locations, protection of wiring system and electrical apparatus, rewirable fuses HRC fuses. — (13hr)

(10) Distribution of Electricity

system of distribution, DC 2 wire system DC 3 wire system, AC single phase 2 & 3 wire, 2 Ph:, 3φ and 4 wire 3φ → 3 and 4 wire systems —— (2hr)

(11) Electrical machinery

DC gen:, Dc motor, Alternator

A.C. motor — 4 hr

Text: Electric wiring
Theory and practice
Jobe & son's

Ref:
Regulation for electrical equipment of building
(IEE)

Electrical Engg: Science
by A. Morley & E Hughes.

Drawing 1st yr

- Introduction
- Lettering
- Information on pictorial Drawing orthographic projections
- Draw plan, front, side elevation of a given.
- (5) Draw sectional plan, elevation of a given
- (6) Draw sectional plan, elevation, true shape of given
- (7) Developments
- (8) Draw plan elevation of given fig:
- (9) ~~Draw~~ (Shown in Iso view)
- (10) Draw Isometric projection of given
- (11) Draw Iso: proj: of given figure (shown in ortho:)
- (12) Draw oblique proj: of given fig: (shown in ortho)
- (13) Draw 2 pt: perspective of given fig: (shown in ortho)
- (14) Draw ortho proj: from wooden block
- (15) Draw Iso: view from wooden block.

Form M.S./009

Union of Burma Five Star Line Corporation

REPAIR LIST

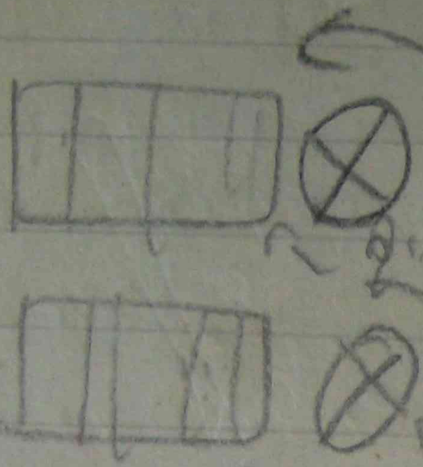
Deck/Engine/Catering M.V./S.S. [illegible] Voy. No. 37 Port [illegible] Date 12-11-76

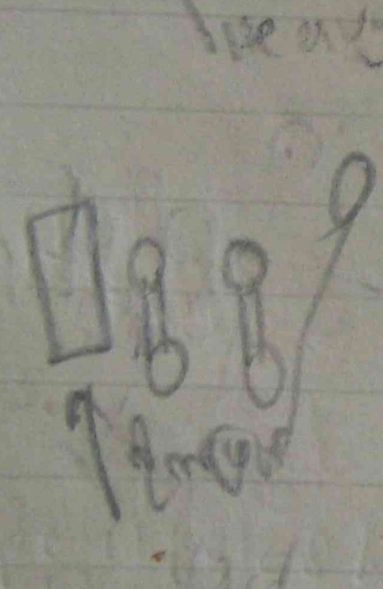
	No.	Nature of Repair	Remarks
	1.	Ammonia plant gas line one section from condenser no.II outlet to expansion valve to be renewed.	
	2.	Two nos. generator fuel high pressure line to be newly made and supplied.	
	3.	Two nos. generator cylinder heads valve seats to be renewed and machined.	
	4.	Three nos. brand new generator cylinder heads combustion side to be machined as indicated by ship staff.	
	5.	M.E no.I cross head bearing to be with ship's spare.	
	6.	St.b crane rotating bearing rack bush to be renewed.	
	7.	One newly made bearing new set as of above to be supplied.	
	8.	Port & St.b cranes deck covering to be cut off and new covering to be installed.	
	9.	External wiring of port and St.b cranes to be renewed.	
	10.	The following sea water pipes to be patched up:- 1. Aft. air cooler 2. M.E sea water pump discharge. 3. Domestic fridge cooler supply.	

GUST 1980
THURSDAY

ဘုဂ္ဂိုလ် ခု၊ ဝါဒေါင်လဆန်း ၁၀ ရက်၊ ကြာသပတေး။။

Heavy gear change ရှိပါ





(12) governor ရှာဆွဲခြင်း ရှိပါသည်

(13) exhaust flator ရှိပါသည်

(14) ဝန်ထမ်းတို့ Harbour Pipe မှ main sea pipe ကို Harbour cooler မှ main cooler ထဲသို့ ဆွဲသွင်းပေးရန်

AUGUST 1980
26th WEDNESDAY

AUG
21st

Machinery boundary
Log book & official & actual day

C/o purifier → for every 8 hours
H/o II → crank case
Sludge / ... 8 hrs
generated → crank case
level ...
C/o pr. ...
Extract ...
H/o Tank ...
... — ... Joint — ...
rocker arm — ...
moving part — ... bush ...
Bilge ...
... → ...

Boiler → water level gauge
pump → pressures
all thermometer temp ...
Gen. ... — tank ...
pr. temp ...
C/o
Every Tank — ... level
every cooler — inlet and
temp — ...
... cooler ...
Bilge ...
piston rod — leak
... pump
code — ...
... H ...

Hydraulic ... Machine
... Hydraulic ... Machine
... Hydraulic ... Machine

Overhaul ... Hydraulic ... Machine
Hydraulic ... Machine
Hydraulic ... Machine

Bilge, G/E, Compressor, Purifier
... warning ...
H/P, ... Bilge ...

Alarm board ① alarm board bell ...
Bell ...
feed ② ...
... ③ Manually ...
fuel level ...
... purifier ...
... pump
... Thermometer
... pump
... fridge ...
... pump

C/G ~~F/O 2·2~~ S/W 1·1

40 4·7 T/O 4·75

F/W 1·8

Inlet ~~53, 53, 54, 54, 54~~, 59

330 380 320 ~~330~~ 260 270

I/O 1m 77

O/W 73

E/G 1 2 3 4 5 6 7

360 370 360 360 375 370 400

57 58 56 56 55 57 56

Ford T/O BLR EX 315 Jac 59 | Aft T/O BLR EX-220 Jac 57

Cyl Tk 68

Drive Tk 7, mod - 4 ~~F/O Tk P → 48~~ ~~Fuel Tk 34~~

F/O Fuel P → 75 | ~~H/O Tk BLR → 43~~ H/O Fuel STB → 80

H/O Fuel Tk → 33 ~~Fuel STB 46~~

H/O cooler → 98, 56

B/O Fuel Tk 1/2 5·6 / 10

H/O Fuel Tk 1/2 13·4 / 8·5

Cam shaft = 0·3

Fuel cooler 58 66 (out)

32 34

T/O cooler

T/O 1m 56 O/W 54

F/W 1m 59 O/W 52

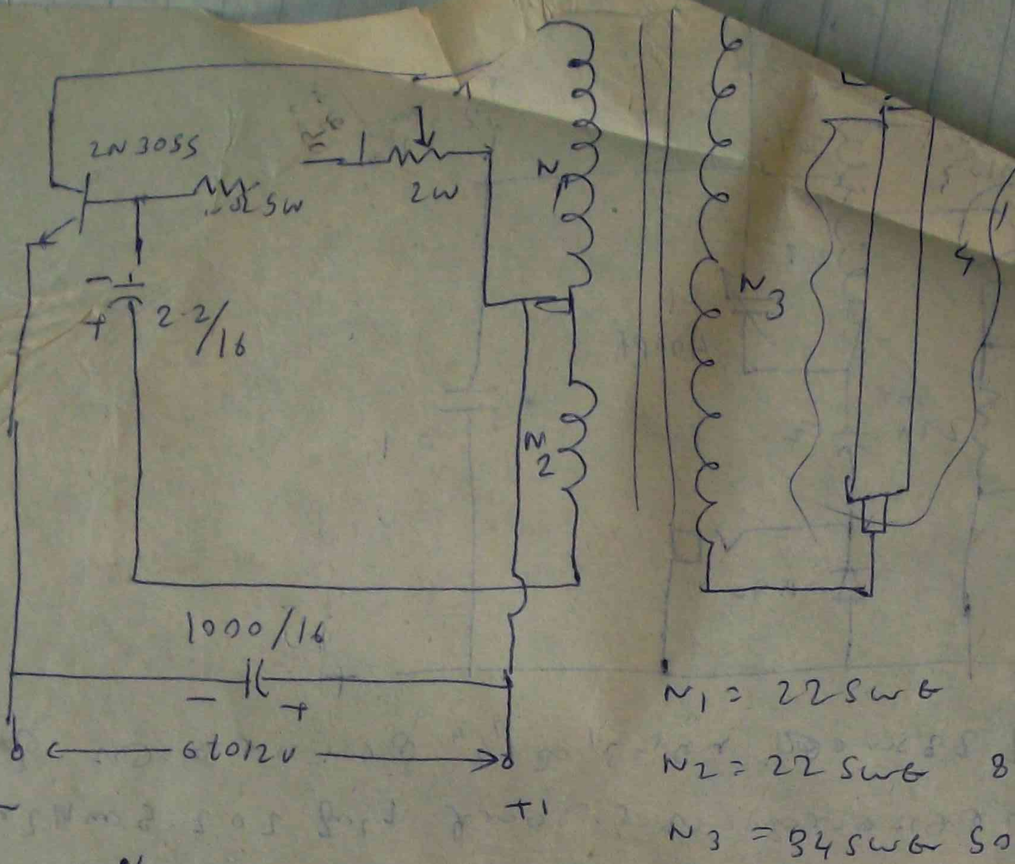
G/E Fm 545 398

Fridge X

T/O service → 230

Tk

Fuel 44 57 44



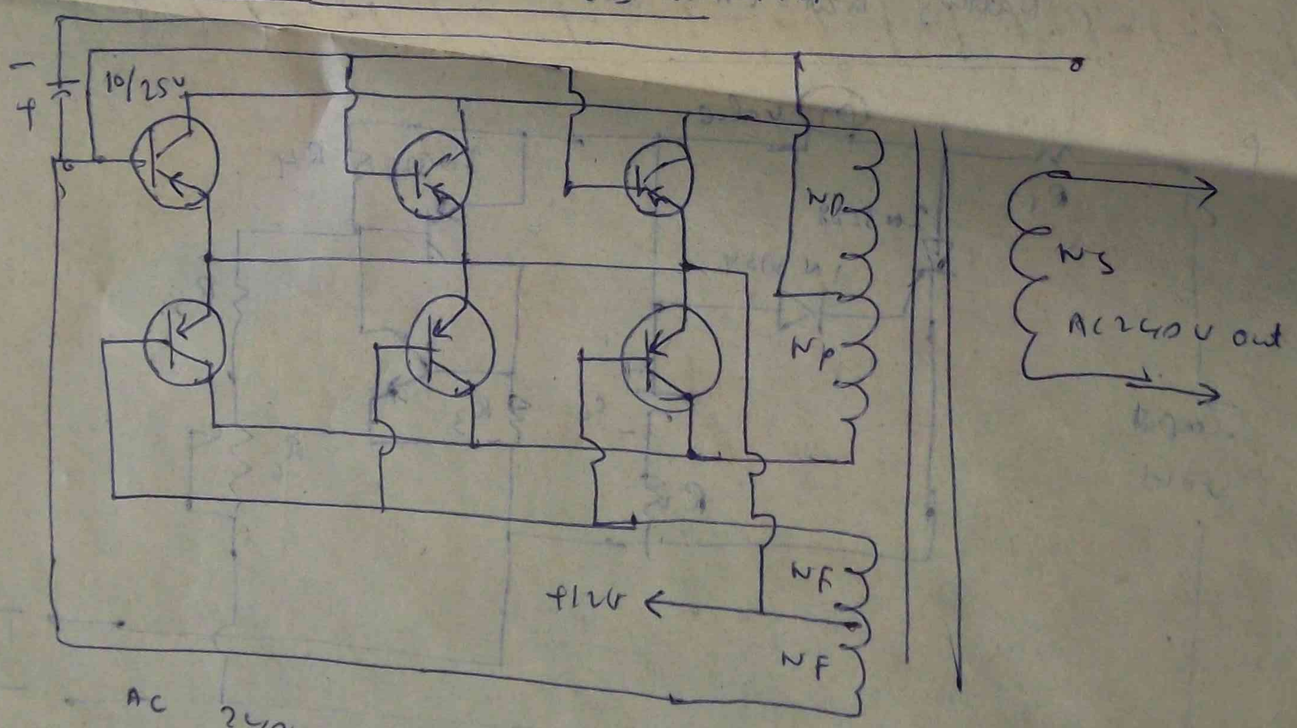
N_1 = 22 SWG 36 Turns

N_2 = 22 SWG 8 Turns

N_3 = 34 SWG 500 Turns.

ఇక్కడ చూపించిన విధంగా 2N3055 (NPN) Transistor కి heat sink ని ఉపయోగించాలి. ట్రాన్స్ ఫార్మర్ లో N_1 భాగాన్ని 2 సమభాగాలుగా చేసి N_2 ని చుట్టాలి. N_3 ని చుట్టిన తరువాత ఇన్సులేషన్ కోసం ట్రాన్స్ ఫార్మర్ చుట్టూ పేపర్ టేప్ చుట్టాలి.

DC 12V to AC 240V 40W SOCKS Inverter



AC 240V 40W SOCKS suitable for drive, SO C/S AC motor, tape recorder and charger

N_P : 50+50 Turns (14 SWG) N_F : 12+12 Turns (20 SWG)

N_S = 1200 Turns (24 SWG)

ఇక్కడ చూపించిన Inverter లో ఉపయోగించిన Push-Pull Transformer ని England లో తయారు చేయించడం జరిగింది. ఈ Transformer కి 30/12 Watts Battery Charger ని కూడా ఉపయోగించవచ్చు.

KIT

Routine Works & Duties Of Junior Engg

MDI (2nd class Part A)

Practical Exam. Course

Engineer Cadet Rajat Nandy

CDL No 16217

M/s Mitchell Cotts

Routine Works & Duties Of Juniors

MDJ (2nd class Part A)

Pratical Exam Course

Engineer Cadet Yusuf Nasir

C3L MC 16 317

M/V Mariam Yusuf

out only afte. I had struggled ... minutes I noticed that my head was bleeding and ... away the blood.

We were taken to the Rangoon People's Hospital. There my injuries were dressed and bandaged. Those ... were ~~serious~~ seriously injured were hospitalized. It ... a very frightening and painful experience. I cannot ... it to this day and still have a bad feeling whenev... I think about it.

My Country

My country is Burma. She regained her indepe... in 1948.

She is in south east Asia. Her neighbours are Bengl... India, China, Laos and Thailand. Her porpulation is over 34... lions now. She has different races such as Kachins, Chins, Kayahs, Karens, Mons, Arakanese and Burmans. Rangoon ... is famous for the Shwedagon pagoda is her capital. She... rivers of my country are the ~~Irra~~ Irrawaddy, the Salwee... Chindwin, the Sittaung and so on.

Although my country is rich in natural resources, ye... is still an agricultural country. We are, therefore, mostly ... We grow many kinds of ~~co~~ crops and vegetables. She is fa... for ~~teak~~. She is also ~~famous~~ famous for her precious sto... The living standard of her peoples is still Low. We ... our national income chiefly from our agricultural produ... She exports teak, rice, some precious stones, some hea... crude oil and so on.

There are many places of interest in Burma. ... three ~~seasons~~ seasons. Our climate is generally hot. Yo... see pagodas almost everywhere in Burma. Her peopl... Buddhists. They are famous for their honesty and h... bility. They are also simple and sincere.

My ultimate aim is to make my country pe... and prosperous. I do want to see my mother Land ... developed. My country hopes that her citizens will d... best for her. And I do hope all my dreams to make ... wich will come true in near future.

... about the vessels

... training

Item No.	Tasks & Duties
1.	Be aware of the location and operation ship's emergency and safety equipment including fire fighting gear, emergency, fire pump, compressor generator/alternator, and life boat engine and of any restrictions and limitations applicable to the use of equipment and working in hazardous areas both at sea and in port.
2.	Prepare main plant for sea from the state of readiness normally kept in a loading or discharging port.
3.	Manoeuvre main machinery entering or leaving port, and on ship's operating with bridge control, change over and manoeuvre main machinery from engineroom controls.
4.	Prepare generator/alternator to run, run up and parallel with running plant and shut down outgoing machinery.
5.	Complete a duplicate set of the company's technical forms including log book, abstracts, wear down and other engine forms, spare gear and stores indents etx.
6.	Transfer bunkers within the ship from doublebottom tanks to settling or service tanks.
7.	Take bunkers from shore tanks or barge to ships tanks.
8.	Complete routine chemical tests on boiler and/or main engine cooling water samples, administer treatment.
9.	Prepare and run fuel oil and lubricating oil treatment plant. (Centrifugal separators).
10.	Prepare and run evaporating/distilling plant.
11.	Prepare and run air compressors.
12.	Prepare and run domestic refrigerating plant and/or air conditioning plant and complete appropriate log book.

Item. No.	Tasks & Duties
13.	Prepare and start steering gear and conduct appropriate tests to ensure correct operation.
14.	Prepare and operate main and auxiliary boilers.
15.	Overhaul and test under working conditions boiler water level gauge.
16.	Pump bilges, prepare and operate oily water separator and complete appropriate log book.
17.	Assist with checks and routine maintenance of instrumentation and control systems.
18.	Assist with routine maintenance of electrical equipment, including safety checks.
19.	Take appropriate readings and complete power calculations for main propulsion machinery.
20.	Act efficiently as assistant watchkeeper at sea in covering routine duties, or assist duty engineer on ships operating in UMS mode which should include testing of general alarm systems.
21.	Be aware of layout of Bridge equipment and its function and purpose.
22.	Assist on Bridge during manoeuvring operations when entering or leaving port.
23.	Stores & Inventry Systems.

"Htay"
27-7-84

Date & place	working	Remarks
20-3-87 (Friday) Atmangalore (Departure)	- Taking the L/O sounding in engine room - Departure stand by duty 4→8 watch keeping	
21-3-87 (Saturday) at sea	- 4 To 8 watch keeping - making boiler water test and dosing - checking the steering and filling the oil tank.	
22-3-87 (sunday) at sea	4 To 8 watch keeping - making the boiler water test and dosing - making the synchronizing of generator.	
23-3-87 (monday) at sea	4 To 8 watch keeping - making the boiler test and dosing - testing the NH_3 leakage with leak detector.	
24-3-87 (Tuesday) at sea	4 to 8 watch keeping Reducing fuel feed for G/E 2 NO 3 unit Temp 200c ↓ 240c Taking L/O sounding making boiler water test	
25-3-87 (wendsday) at sea	4 to 8 watch keeping - making synchronizing making boiler water test	
26-3-87 (Thursday arrival Agm- Pilot	4 to 8 watch keeping Boiler water Test Taking L/O soundings	writing life boat engine operation
27-3-87 Friday at Pilot	writing 4 to 8 watch keeping experience and knowledge	

Date and Place	Working	Remark
10-3-87 (Tuesday) At mangalore	- Disassembling the G/s pump, Adjusting the impeller nut, servicing and refitting.	
11-3-87 (wendsday) At mangalore	- Disassembling the emergency fire pump crank case cover, checking, replacing L/o and refitting	
12-3-87 (Thursday) At mangalore	- Disassembling the nozzle cooling attach pump of GE_2, overhaul, refitting and test run	
13-3-87 (Friday) At mangalore	- Disassembling the plunger, barrel of G/E_2 - study of operation and fitting - overhaul of relief V/v of M/E unit 3.	
14-3-87 (Saturday) At mangalore)	Holidays	
15-3-87 (Sunday) At mangalore		
16-3-87 (monday) At mangalore)	(1) Cleaning F/o filters, L/o filters & centrifugal filters of G/E_2 (2) Shifting stand by duty.	
17-3-87 (Tuesday) At mangalore	Study of Indicator cards. Painting the H/o purifier heater Study of Deck machineries & fire fighting system	
18-3-87 (wendsday) At mangalore)	Starting and test run of spate pump. Study of main switch board & alarm systems.	
19-3-87 (Thursday)	- Disassembling of Turbocharger filter, cleaning and refitting.	

4 to 8 Watch Keeping

(watch ന്റെ ഉത്തരവാദിത്തങ്ങൾ)

watch ന്റെ Quantor ചെയ്യേണ്ടതായ കാര്യങ്ങൾ ഇവയാണ്

① Funnel ന്റെ ഏറ്റവും മുകളിൽ നോക്കി Fire sparking ഉണ്ടോ എന്ന് നോക്കുക

② Steering flat ന്റെ (a) motor (b) ന്റെ level ഉം leakage ഉം hand pump ന്റെ pressure ഉം നോക്കുക

(c) കൂടാതെ leak ഉള്ളിടത്തെല്ലാം നോക്കി check ചെയ്യുക

(d) Decky wheel ന്റെ ഉള്ളിൽ steering ന്റെ working check ചെയ്യുക

(e) കൂടാതെ Engine ന്റെ ഉള്ളിൽ നോക്കുക

③ Engine നോട് ചേർന്നുള്ള ഉള്ള Low tank ഉം High tank ന്റെ level നോക്കുക. Boiler ന്റെ water level gauge നോക്കുക. കൂടാതെ Pressure ന്റെ level നോക്കുക

④ കൂടാതെ main Engine ന്റെ cylinder ന്റെ Jacket, exhaust നോക്കുക. exhaust ന്റെ താപനില നോക്കുക. temp: ഉയർന്നാൽ engine നിർത്തുക. കൂടാതെ cyl: oil tank ന്റെ level നോക്കുക

⑤ കൂടാതെ Wheel ന്റെ selector switch (Parameter) ഉള്ളിൽ (meat ഉണ്ടോ എന്ന് നോക്കുക. -1 ന്റെ fridge ന്റെ temp: നോക്കുക)

⑥ rocker arm oil tank ന്റെ level, cylinder ലേക്കുള്ള pipe, connecting rod ഇവ നോക്കുക

⑦ Turbo blower cooling ന്റെ water ഉം, Turbo blower ഉം നോക്കുക. generator ന്റെ bearing temp: നോക്കുക. crankcase ന്റെ level നോക്കുക. T/o, F/o s/w, F/w pr: ഉം നോക്കുക. exhaust Jac: Temp: നോക്കുക. Load നോക്കുക. cooler നോട് ചേർന്നുള്ള F/w diff: Jack, exh: diff നോക്കുക

⑧ camshaft service tank ന്റെ level, lubricator ന്റെ level, Turbo oil pump, filter എന്നിവ നോക്കുക

⑨ Nozzle cooling ന്റെ നോട് ചേർന്നുള്ള, pump ചെയ്യുന്ന, purifier നോട് ചേർന്നുള്ള ഉള്ളിൽ നോക്കുക. main switch board ന്റെ നോക്കുക

⑩ വെള്ളം കടത്തിവിടുന്ന pipe ഉം വെള്ളം ഒഴുകുന്നുണ്ടോ എന്നും ഉള്ളിലുള്ള joint ഉം നോട് ചേർന്നുള്ള എന്നിവ നോക്കുക. ഉള്ളിൽ നിന്നുള്ള വെള്ളം നോക്കുക (മറ്റിടങ്ങളിൽ ഇതിനെ നോക്കുക)

⑪ M/E ന്റെ Boards ന്റെ meter ഉം gauge ഉം F/w cooling, s/w piston, Bearing, L/O pr:, Oil filter, Nozzle cooling (piston oil pr:) നോട് ചേർന്നുള്ള എന്നിവ നോക്കുക. Jac:, piston inlet L/O, F/w cooler, L/O cooler എന്നിവ നോക്കുക

⑫ Bilge നോട് ചേർന്നുള്ളിടത്തെല്ലാം നോക്കുക. Air reservoir ന്റെ pressure ഉള്ളിൽ നോക്കുക

(L/O cooler ന്റെ ഉള്ളിൽ നോട് ചേർന്നുള്ള Temp: diff: നോക്കുക)

(pump ಗಳು, mainline ಗಳು, pipe ಗಳು, cooler, H/V, heater, ಮುಂತಾದವುಗಳ
Pressure, Temperature, ಸಾಮರ್ಥ್ಯ, condition, ಸ್ಥಿತಿ, ಮಾಹಿತಿಗಳನ್ನು ದಾಖಲಿಸಬೇಕು.)

(13) Thurst bearing ಪ್ರತಿಯೊಂದಕ್ಕೂ ಸಂಬಂಧಿಸಿದ ಸಾಮಾನ್ಯ ಮಾಹಿತಿ ಮತ್ತು H/o purifier ಬಗ್ಗೆ ಮಾಹಿತಿಯನ್ನು ಸಂಗ್ರಹಿಸಿಡಬೇಕು.

(14) Exhaust flap degree ಅನ್ನು ತಿಳಿಸಬೇಕು

(15) Black board ಒಂದರಲ್ಲಿ ಪ್ರತಿದಿನ ತೈಲ ಸಂಗ್ರಹಣೆಯ ಮಾಹಿತಿಯನ್ನು ತಿಳಿಸಬೇಕು. ಹಡಗಿನಲ್ಲಿರುವ ಎಲ್ಲಾ new tank ಗಳು ಮತ್ತು ಹಳೆಯ ತೈಲ ಸಂಗ್ರಹಣೆಯ ಮಾಹಿತಿಯನ್ನು ತಿಳಿಸಬೇಕು.

(16) ಪ್ರತಿಯೊಂದು Log book ಅನ್ನು ತಿಳಿಸಬೇಕು Duty ಅವಧಿಯಲ್ಲಿ ಪ್ರತಿ ಗಂಟೆಗೊಮ್ಮೆ temp, ಒತ್ತಡ ಇತ್ಯಾದಿ, ಸಾಧನಗಳಲ್ಲಿ Bearing ಗಳು, F/w cooling ಅನ್ನು ಪ್ರತಿಯೊಂದನ್ನೂ ಪರಿಶೀಲಿಸಬೇಕು.

(17) ಪ್ರತಿಯೊಬ್ಬ watch keeper ಅವರ duty ಸಮಯದಲ್ಲಿ regular round inspection, ಮತ್ತು watch works ಅನ್ನು ಪ್ರತಿಯೊಂದನ್ನೂ ಪರಿಶೀಲಿಸಬೇಕು.

ಗಮನಿಸಿ

ಪ್ರತಿಯೊಂದು ಭಾಗದ quarter ಗಳಲ್ಲಿ ಇರುವ ಎಲ್ಲಾ ಸಾಮಾನುಗಳ ಮಾಹಿತಿಯನ್ನು ತಿಳಿಸಬೇಕು.
{ಉದಾ - P/Steering, High Pr, Expansion Pr, cyl: Exhaust mani, gen: Exhaust mani, cooler, purifier, Joint ಗಳು ಇರುವ ಸ್ಥಳ ತಿಳಿಸಬೇಕು.
- Sea chest V/V ಗಳನ್ನು ಯಾವ ಕಡೆ, seawater ಇರುವ ಸ್ಥಳ ಮತ್ತು ಎಷ್ಟು ಇವೆ ಎಂಬುದನ್ನು ತಿಳಿಸಬೇಕು.
- ಭಾರವಾದ ಯಂತ್ರಗಳಲ್ಲಿ Bearing ಗಳ ಉಷ್ಣತೆ, Temp ಅನ್ನು ಪ್ರತಿದಿನ ತಿಳಿಸಬೇಕು.}

29/3/87

(watch ಗಳಲ್ಲಿರುವಾಗ ತೆಗೆದುಕೊಳ್ಳಬೇಕಾದ ಕ್ರಮಗಳು:)

M/E ಗೆ ಸಂಬಂಧಿಸಿದಂತೆ

① Lub oil pump, turbo oil pump, air compressor ಗಳ ಬಳಕೆಯಲ್ಲಿ 22 kg/cm² ಒತ್ತಡವಿರಬೇಕು. Boiler ನಲ್ಲಿ ನೀರಿನ ಮಟ್ಟ ಸರಿಯಾಗಿರಬೇಕು. H/o heater ನ boiler ಗೆ ಸಂಪರ್ಕ ಇರಬೇಕು. (exhaust boiler ನಲ್ಲಿ ಸಾಕಷ್ಟು ನೀರು ಇಲ್ಲದಿದ್ದಾಗ H/o heater ನಲ್ಲಿರುವ ನೀರನ್ನು ಬಳಸಬೇಕು).

② Turning gear ನಲ್ಲಿ, ಬೇರಿಂಗ್ gland ಸೋರಿಕೆಯಾಗಬಾರದು. Deck ನಲ್ಲಿ ~~ಪ್ರೊಪೆ~~ propeller ಅಥವಾ ಅದರ ಶಾಫ್ಟ್ ಇರಬೇಕು. ಈ ಎಲ್ಲಾ Turning gear motor ನ ಬಳಕೆಯನ್ನು ಪರೀಕ್ಷಿಸಿ ನೋಡಿ ಖಚಿತಪಡಿಸಿಕೊಳ್ಳಬೇಕು. Turning gear ನ hand pump ಮೂಲಕ ಪರೀಕ್ಷಿಸಿ (Turning gear ನ ಹತ್ತಿರವಾಗಿರುವ Turning gear ನ forward ಬಳಕೆಯನ್ನು ಪರೀಕ್ಷಿಸಿ, reverse ಬಳಕೆಯನ್ನು ಪರೀಕ್ಷಿಸಿ ಮೂಲಕ ಇರಬೇಕು) ಬಳಕೆಯ ಬಗ್ಗೆ ಮಾಹಿತಿಯನ್ನು ತಿಳಿಸಬೇಕು.

③ Harbour F/w P/p ಮತ್ತು main F/w P/p (Pr: 2.5), Harbour S/w ಮತ್ತು main S/w P/p S/w Pr: (~~1.66~~ 2.6) ಇರಬೇಕು.

④ Indicator cock ಗಳು ಸರಿಯಾಗಿ ಬಳಕೆಯಲ್ಲಿರಬೇಕು. booster P/p ನಿಂದ ಬಳಕೆಯಲ್ಲಿ ತೈಲವು combustion chamber ಗೆ ಸರಿಯಾಗಿ ಸಿಂಪಡಣೆಯಾಗಬೇಕು.

⑤ gen: ಎಲ್ಲವೂ ಸರಿಯಾಗಿ, warming ಆಗಿರಬೇಕು. ಇದರಲ್ಲಿ ತೈಲವು ಸೋರಿಕೆಯಾಗಬಾರದು.

⑥ air cooler ಗಳ S/w ಮತ್ತು ಅದರ ಸೋರಿಕೆ ಇರಬೇಕು.

⑦ H/o ನ ತೈಲದ link ಗಳು & maneuvering gear, reversing gear, hand lub: point ಗಳು ಸಾಕಷ್ಟು ಇರಬೇಕು. cyl: lub ಆಗಿ, camshaft lub: service ಆಗಿರುವಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು.

⑧ generator ನ ತೈಲದ ಸೋರಿಕೆಯಾಗದಂತೆ ಸಿಂಕ್ರನೈಸ್ ಆಗಿರಬೇಕು.

⑨ ತೈಲದ filter ಗಳು ಅಡಚಣೆಯಾಗದಂತೆ & starting duty, ಒತ್ತಡದಲ್ಲಿನ ವ್ಯತ್ಯಾಸಗಳನ್ನು ಗಮನಿಸಿ ಅಡಚಣೆಯಾಗಿದ್ದಲ್ಲಿ ಸರಿಪಡಿಸಬೇಕು.

⑩ Fuel oil service ನ P/p High Pr, H/o service ನ P/p ಸರಿಯಾಗಿ ಕೆಲಸ ಮಾಡಬೇಕು.

⑪ Deck ನ ತೈಲದ connection ಗಳನ್ನು cargoing ಮತ್ತು power shut off, Fore water ballast pipe ಮತ್ತು Bilge pipe ಗಳ connection ಗಳನ್ನು, capstan power whistle power ಇತ್ಯಾದಿಗಳನ್ನು ಪರೀಕ್ಷಿಸಬೇಕು.

⑫ ಭಾರವಾದ ತೈಲದ F/o, L/o sounding ಗಳು ಸರಿಯಾಗಿ ಇರುವಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು. Log book ಗಳಲ್ಲಿ ~~actual~~ official ಮತ್ತು actual ಗಳನ್ನು ಪ್ರತಿದಿನ ಬರೆಯಬೇಕು.

⑬ ತೈಲದ ಶುದ್ಧೀಕರಣ, purifier ಬಳಕೆಯಲ್ಲಿ ಸಂದರ್ಭದಲ್ಲಿ starting time ಅನ್ನು ಗಮನಿಸಿ ಅಡಚಣೆಯಾಗಿದ್ದಲ್ಲಿ ಸರಿಪಡಿಸಬೇಕು.

⑭ steering ನ ತೈಲದ ಒತ್ತಡ ಸರಿಯಾಗಿ ಇರುವಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು. ತೈಲದ oil cut ನಲ್ಲಿ blower ಗಳನ್ನು maintain ಮಾಡಬೇಕು.

29/3/87

M/E ~~Watch~~ ઉપર કામ કરવાની રીત

(1) Inspection & general works

આ ઉપરાંત ચાલુ ફરજ દરમ્યાન આ નીચે મુજબ ની વસ્તુઓ ઉપર ખાસ watch રાખવી પડે છે.

① cyl માં દરેક exhaust temperature, jacket temperature ની તપાસણી કરવી. exhaust ગેસ નો રંગ ચકાસવો. Normal ગણવા માટે ચા. ઉપરોક્ત 4100 BHP ના એન્જીન ની speed ને ઉપર કે નીચે કરવા માટે governor ની speed વધારવા કે ઘટાડવા માટે air cooler પંખાની ઉપર ની ચાલુ કે બંધ કરવી. તથા fuel index ની સ્થિતિ ચકાસવી.

② main Indicator board પર Indicator ના બારીક normal વર્કિંગ ની તપાસણી કરવી.

③ Temperature, pressure ના નોંધ કરેલા ઉપરાંત ફરજ દરમ્યાન ચકાસવું ઉપર ધ્યાન રાખવું.

રાખવું - Bearing temp, Camshaft temp, Nozzle cool pipe, fuel oil pr: temp, Flw cooling press, piston cooling, Slw cooling press, fuel Oil before filter, fuel oil after filter, rpm thurst bear pr: temp: (Stbd), H/o end heater H/o end pipe temp:, boiler Pressure / Jr Temp / piston inlet temp:, S/w, F/w, G/s, H/o pipe ના બંને pressure / H/o before, after cooler ના બંને pressure / F/w cooler, T/o cooler, Nozzle cooler, H/o cooler ના બંને ચકાસવા કે નોંધ કરવા.

Scav: air temp, S/w cooler temp, air cooler ના temp. ના નોંધ કરવા. (આ ઉપરાંત ચકાસવા.)

④ Purifier ના બંને temp. ના નોંધ કરવા.

H/o, F/o service ટાંકી ના sounding ચકાસવા / નોંધ કરવા / આવશ્યક ની. આવશ્યકતા જણાયે oil level ફેરવવું. જરૂરી valve ખોલવા કે બંધ કરવા.

ઉપરાંત ચીફ ને જરૂરી ની જાણ કરવી. Purifier ચાલુ કરે. Purifier ની oil level ફેરફાર કરવા. જરૂરી valve ચાલુ કે બંધ કરવા. વગેરે ની જાણ કરવી.

⑤ Generator ના Load ની જરૂરિયાત મુજબ H/o, T/o F/w S/w F/o pressure, H/o cooler in/out temp ની નોંધ કરવી. Jr,

Exhaust ચકાસવા. crank case oil level ચકાસવું ફેરફાર જણાયે ફેરફાર કરવો.

⑤ Generator ની ચાલુ કરતાં પહેલાં F/w, S/w Exp: Tk return line, H/o Tk ના air vent valve ચકાસવા. Load કરતાં પહેલાં synchronizing તપાસવું. ચકાસવા alarm ચકાસવા જેમ કે bell alarm, electrical alarm ની નોંધ કરવી. governor flywheel ની oil level ચકાસવી. tappet ની ચાલ ચકાસવી. ની ચકાસણી કરવી. Bilge ચકાસવું / Dirty oil tank ચકાસવું. m bilge pipe, ચકાસવા. Dirty oil ની જરૂરિયાત મુજબ ખાલી કરવી. Deck water ની G/S pipe ચકાસવા. bilge pipe ચકાસવા. જરૂર પડે ત્યારે ચાલુ કરવી. ballast ચકાસવા. જરૂરિયાત મુજબ ફેરફાર કરવો.

⑥ Turning shaft ના bearing / tunnel ના ગ્લાન્ડ ની ચકાસણી કરવી. ગ્લાન્ડ ચકાસવા / ગ્લાન્ડ ની જરૂરિયાત મુજબ ફેરફાર કરવો.

⑦ Turbo blower cock ની flow ની દિશા ચકાસવી. જરૂરિયાત મુજબ ફેરફાર કરવો. exh: Jr ની ની નોંધ કરવી.

⑩ boiler ના pressure, level gauge ના level ચકાસવા. feed Tk ની level ચકાસવા. ની જાણ કરવી.

⑪ every moving part ના ફરતા ની ચકાસણી, ની જાણ કરવી. other airm oil Tk ની level ચકાસવી. filter ના ફેરફાર ચકાસવા.

⑫ રાત્રે watch માં ચાલુ, ફરજ ની જાણ / ચકાસણી ની નોંધ કરવી.

⑬ H/o end heater pr:, temp: ની ચકાસણી કરવી.

⑭ exhaust flap ની ચાલ ચકાસવી / ફેરફાર કરવો.

⑮ fuel Tk ની fuel level, fuel pipe leakage, fuel seal ની leakage to pipe ની / gland leakage, joint leakage / ફેરફાર ચકાસવા

⑯ seal test / ચકાસવી / ફેરફાર ચકાસવા

⑰ oil, H/o, F/o Tk ના ચકાસવા, air Tk ના ચકાસવા / drain ની ચાલ / ચકાસવી.

⑱ auto clean filter ની handle ચકાસવી. clean / ચકાસવી.

⑭ engine ના બધા bolt, nut, ચકાસવા / ચકાસણી / ચકાસવા / ની. ઉપર, ચકાસવા.

⑳ ચકાસવા ના electrical ની ચકાસણી / ચકાસવા / ની નોંધ ફેરફાર કરવી.

㉑ meat temp, fridge suction ની ચકાસવી. fridge ની ચાલ ચકાસવી / ચકાસવી.

㉒ Log ચકાસવી. Log ચકાસવી, Speed, Rev. counter ચકાસવી / ની ચકાસવી. consumption / ચકાસવા

(2) Special works for 4 to 8 watch

(1) Form of bridge ... Lee Rudder ...
(2) L/O sounding ...
(3) steering ...
(4) Boiler water test ...
(5) ... ...
(6) L/O purifier ... filter ... L/O purifier ...
(7) L/O sump ...
(8) C/E blank board ... fresh water ... Domestic ...
(9) Hydrophore ... Fresh water ... Domestic ...
(10) Tank y sludge ... Pump out ...

Harbour / cargo / ... level ...

(3) Tasks & duties ...

(Duty ... Navig. ... Navigation ... Safe ... Care ...)

① Be aware the location and operation ship's emergency and safety equipment including fire fighting gear, emergency fire pump, compressor, alternator and life boat engine. (3 to 7 month ...)

② Prepare main plant for sea from the state of readiness normally kept in a loading or discharging port.

(M/E ... main engine working principle ... C/E, compressor, steering control, P/P ... purifier ...) (3 to 7 month ...)

Loading & discharging

Load ... Load ... Engine ... (1) No.1 crane ... (2) cargo winch power ...

... No.1 crane ... level, center crane ... level, motor ... No.1 crane ...

③ manoeuvre main machinery entering or leaving port, and on ship's operating with bridge control, change-over and manoeuvre main machinery from engine room control.

{main engine operation ...}

④ Prepare generator/alternator for run, run up and parallel with running plant and shut down out going machinery.

C/E ... run ① L/O sump ... ② fly wheel ... L/O pipe ...
③ Flw, s/w, air, F/O ... return ... (temp ...)
④ blow out ... Indicator cock ... ⑤ Indicator cock ... Normal ... ⑥ L/O flw s/w pr Jacket temp, RPM/Ex Temp ... on board ...

⑤ Alarm system, Bell alarm ... Lag (Exh: Temp) ... run ... Load ... speed control ..., Load ... speed ...

① Load ... (... gen: main Load ...)
② speed control ..., Load ...
③ ... other Load ...
④ Indicator cock ...
⑤ ...
⑥ ... alarm ... alarm board, bell alarm ... Duty ...
⑦ flywheel ... key ...

⑨ complete duplicate set of company's technical forms including logbook.

(I) Logbook ...

(i) Rev: counter ...

- watch ... 10 ... Rev: counter ...
- ... watch ... rev: counter ... counter ...
- ... rev: dial ... 240° ...
- ... other ... (—) ...

watch ... key ... Jacket ... S/W temp: ... wind direction ... log ...

(ii) Log ammonia refrigeration operation

Design ಮಾಡಿರುತ್ತೆ:

(a) Jacketing, head, H/O ಪೈಪ್ (P), H/O tank ಗಳು, H/O ಪೈಪ್ಗಳು, pump ಗಳು:

(b) Exhaust, ಜಿ Temperature

(c) Turbocharger F A
Exhaust
(d) scavenging ಜಿ. Temperature
air of temperature after cyl:, receiver, after cyl:
stage I stage II

(e) Aircooler Fore Aft.
SW SW Temp:

(f) Turbo oil cooler IN SW IN
out out

(g) H/O ಪೈಪ್ ಗಳು, H/O ಪೈಪ್ ಗಳಲ್ಲಿ ಇರುವ ಒತ್ತಡ, ಪೈಪ್ ಗಳಲ್ಲಿ ಇರುವ temp
of level

(h) NOZZLE COOLING IN — out

(i) Flow meter

(j) of each of H/O, F/W, T/O, S/W pressure
H/O cooler IN, OUT, ಜಿ, Exh temperature

(k) F/W cooler of F/W IN, out, S/W, IN, out

(l) H/O cooler of H/O IN, out, S/W IN, out

(m) S/W pipe of temperature

(n) sta H/O pipe of pressure

(o) H/O filter IN, out, purifier temp:, thrust block temp
Pressure

(p) H/O end heater pressure, end pump temperature

(q) cyl: cooling discharge, piston cooling inlet, S/W, F/W
T/O, camshaft, F/O belt: filter, bearing of. of pressure
nozzle cooling pressure
of ಆಗಿರುತ್ತೆ ಅಂತ ತಗೊಂಡಿರುತ್ತೆ.

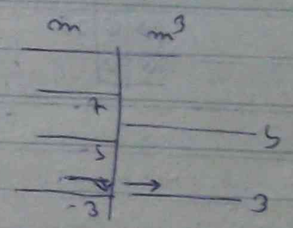
(iii) consumption/watch ಅಂತ.

ನಿನ್ನೆ watch ನ reading ಕ್ಕೆ, ಇವತ್ತಿನ watch ನ reading ನ ನಡುವಿನ difference ಆಗಿರುತ್ತೆ. ಆಯಿಲ್ consumption/watch = diff: of reading x .84 / 1000

H/O consumption/watch = diff: of reading x .95 / 1000

(iv) L/O sump ಅಳತೆ:

sump ಅಲ್ಲಿ tape ಇಟ್ಟು ಅಳತೆ: ಮಾಡಿರುತ್ತೆ



2 ಅಡಿ 30 cm ಆಳ: ಇದೆ
30 cm = 0.3 m

∴ 30 cm = 3000

ಇದನ್ನು ಆಧರಿಸಿ ನಾವು ಅಳತೆ: ಮಾಡುತ್ತೇವೆ. Nil (ಆಳ) ← P (cm)
(−)ನ ಗುರುತು ಇರುತ್ತೆ

(v) L/O sounding

Log book ನಲ್ಲಿ forenoon ಹಾಗೂ afternoon ಆಗಿ sounding (H/O, D/O, L/O, C/O) ಆಗಿರುತ್ತೆ. L/O ಯನ್ನು C/O ಯಲ್ಲಿ ಅಳತೆ: ಮಾಡಿರುತ್ತೆ cmd ನ್ನು Liter ಗೆ ಅಳತೆ: ಮಾಡುವುದಕ್ಕೆ ಇರುವ ಕೋಷ್ಟಕ ಇರುತ್ತೆ: ಅಲ್ಲಿ ನಾವು ನೋಡಿ ಅಳತೆ: ಮಾಡಿರುತ್ತೆ. compare ಮಾಡುತ್ತೆ — actual, official, difference ಅಂತ ಇರುತ್ತೆ

Log book ನಲ್ಲಿ ಇರುವ ಅಂಶ: ಗಳನ್ನು ಗಮನಿಸಿ, other point H/O consumption ಅನ್ನು ಹುಡುಕಿರುತ್ತೆ

(vi) watch ಗಳಲ್ಲಿ: ಇರುವ ಅಂಶ: ಗಳನ್ನು ಗಮನಿಸಿ ಅವುಗಳ ಬಗ್ಗೆ: ಅಂತ ಇರುತ್ತೆ
ಉದಾ - fridge ಬಗ್ಗೆ: ಹೇಳಿರುತ್ತೆ, ಟೇಬಲ್ ಬಗ್ಗೆ: ಹೇಳಿರುತ್ತೆ, pipe ಬಗ್ಗೆ: ಹೇಳಿರುತ್ತೆ
ಇದರ ಹೊರತಾಗಿ ಅಂಶಗಳು -

(II) Spare form

(3)

To monitor bacteriological quality of treated water during its passage through the distribution system, samples are collected from various points in the distribution system and tested for bacteriological quality. The number of samples to be collected depends on the population served by the water supply system. The following table gives the minimum number of samples to be collected per month for different population groups.

Population served	Minimum number of samples per month
Upto 5000	5
5001 to 10,000	10
10,001 to 25,000	15
25,001 to 50,000	20
50,001 to 1,00,000	30
1,00,001 to 2,00,000	40
2,00,001 to 3,00,000	50
3,00,001 to 4,00,000	60
4,00,001 to 5,00,000	70
5,00,001 to 6,00,000	80
6,00,001 to 7,00,000	90
7,00,001 to 8,00,000	100

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5,00,001 to 6,00,000	80
6,00,001 to 7,00,000	90
7,00,001 to 8,00,000	100

(4) Purpose and various kinds of sludge and sludge treatment.

Sludge is a semi-solid material produced during the treatment of wastewater. It is a mixture of water and solid particles that have been removed from the wastewater. Sludge can be classified into different types based on its source and characteristics.

(i) Primary sludge: This is the sludge that is produced during the primary treatment of wastewater. It is the sludge that settles at the bottom of the primary clarifier tank. Primary sludge is typically rich in organic matter and has a high water content.

(ii) Secondary sludge: This is the sludge that is produced during the secondary treatment of wastewater. It is the sludge that is produced by the biological treatment process. Secondary sludge is also rich in organic matter and has a high water content.

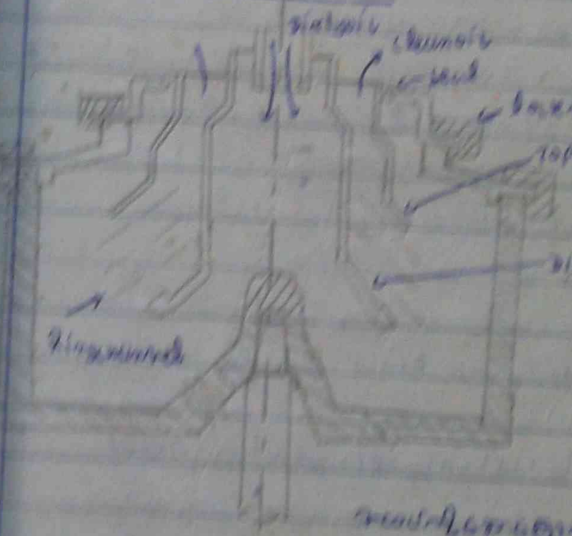
(iii) Tertiary sludge: This is the sludge that is produced during the tertiary treatment of wastewater. It is the sludge that is produced by the chemical treatment process. Tertiary sludge is also rich in organic matter and has a high water content.

(iv) Digested sludge: This is the sludge that is produced during the anaerobic digestion process. It is the sludge that is produced by the breakdown of organic matter by microorganisms in the absence of oxygen. Digested sludge is also rich in organic matter and has a high water content.

(v) Activated sludge: This is the sludge that is produced during the activated sludge process. It is the sludge that is produced by the biological treatment process. Activated sludge is also rich in organic matter and has a high water content.

(vi) Trickling filter sludge: This is the sludge that is produced during the trickling filter process. It is the sludge that is produced by the biological treatment process. Trickling filter sludge is also rich in organic matter and has a high water content.

Sludge treatment:



Sludge treatment is the process of reducing the volume and organic content of sludge. The following are the various methods of sludge treatment:

(i) Thickening: This is the process of removing water from sludge to reduce its volume. It is done by gravity thickening, flotation thickening, or centrifugation.

(ii) Digestion: This is the process of breaking down organic matter in sludge by microorganisms in the absence of oxygen. It is done by anaerobic digestion.

(iii) Conditioning: This is the process of adding chemicals to sludge to improve its dewaterability. It is done by adding polymers, lime, or ferric chloride.

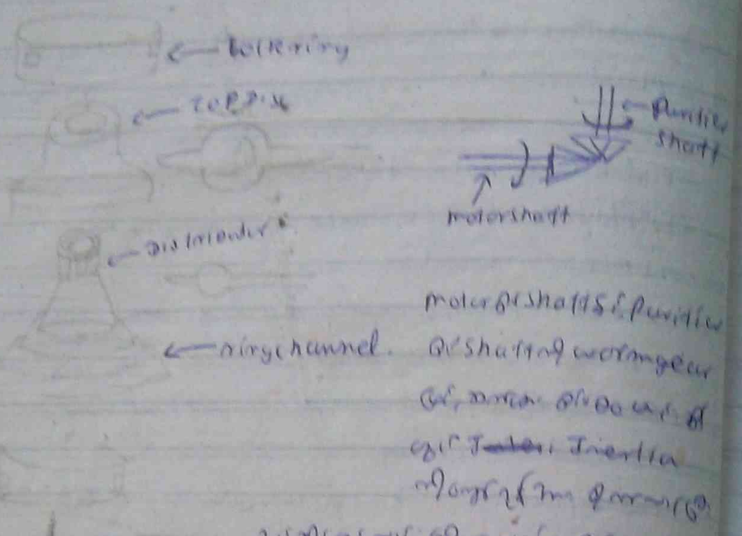
(iv) Dewatering: This is the process of removing water from sludge to reduce its volume. It is done by centrifugation, belt filter press, or vacuum filtration.

(v) Drying: This is the process of removing water from sludge to reduce its volume. It is done by thermal drying or solar drying.

(vi) Incineration: This is the process of burning sludge to reduce its volume. It is done by incineration.

(vii) Composting: This is the process of decomposing sludge by microorganisms in the presence of oxygen. It is done by composting.

(viii) Land application: This is the process of applying sludge to land as a fertilizer. It is done by land application.



motor & shaft & purifier
& shaft of worm gear
of, more or less
of Inertia
of worm gear
worm gear: steel
shaft of steel, worm
gear of copper, worm
& shaft of worm
gear of cast iron
45 cont' or =

oil purifier of more or less
of worm gear
centrifugal filter of =

(10) Prepare and run air compressor

(11) Prepare and run distilling, refrigeration plant.

(12) Prepare and start steering gear and conduct appropriate tests to ensure correct operation

(13) Prepare and operate main & aux: boiler.
Boiler of (1:6), fire & gland =
Feed water of: pump of: (1:6)

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(14) Pump bilges

- of bilge of bilge of tunnel bilge well of
of
- fore peak, sleeper of of
receiving: bilge pip of of
of bilge pip
- Bilge pip of
- s/w Bilge of bilge pip
of, of
pipe of
dirty oil of
oil: of pipe of

(15) Assist with checks and routine maintenance of instrumentation and control system.

of

Following routine maintainance
(1) pump out sludge Tank as necessary
(2) clean f/o purifier everyday
(3) check refri: plant
(4) Check steering & fill oil as necessary
(5) clean filter of all purifiers & f/o filter
(6) To clean H/o calitier every 3 day
(7) To fill warm water boiler and drain all f/o tanks,
(8) To clean f/o filter of d/b
(9) Check & fill stern tube header tank
(10) To clean H/o calitier every 3 day or as necessary
(11) To clean m/e f/o filter & flow meter filter
everyday

Weekly
(1) fuel filter → to drain deposite
(2) crankcase, rocker arm - Inspect oil level
(3) fuel pip - Inspect fuel leak
(4) Air tank air cooler - drain

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(5) outside engine - lignen bolt and
impeltoil ಸ
leak of oil fuel

(6) piping, - impelt gland, leak.
ಆಫ್ ಲೈನ್ ಮಾಡಿ ಸರಿಪಡಿಸುವುದು, tappet ಹೊಂದಿಸುವುದು, ಆಯಿಲ್ ಲೀಕೇಜ್
ಪರೀಕ್ಷಿಸುವುದು

(18) Assist with routine maintenance of electrical equipment including safety checks.

(1) accomodation, E/R light ಆನ್:, running cargo winch ಆನ್: crane ಆನ್:, navigation light, gyro compass light / cabin light ಆನ್: ಆಗಿರಬಹುದು ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(2) Blower motor ಆನ್: ಆಗಿದೆಯೇ ಎಂದು checking ಮಾಡುವುದು.
(3) starter ಆನ್: ಆಗಿ contactor ಆನ್: ಆಗಿದೆಯೇ ಎಂದು servicing ಮಾಡುವುದು
E/R, steering, cargo winch, Life boat.
(4) cargo cluster light ಆನ್: ಆಗಿರಬಹುದು ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(5) windlass, capstan, cargo crane motor ಆನ್:
motor gen: set motor ಆನ್: ಆಗಿದೆಯೇ ಎಂದು servicing, megger test
ಮಾಡುವುದು.
(6) steering, F/w PIP, L/O PIP, Transf PIP, G/S PIP.
S/w PIP, Harbour PIP. motor ಆನ್: ಆಗಿದೆಯೇ megger test ಮಾಡುವುದು servicing ಮಾಡುವುದು.
(7) Purifier motor ಆನ್: ಆಗಿ relay setting ಆಗಿದೆಯೇ ಎಂದು
(8) Booster PIP motor ಆಗಿರಬಹುದು ಎಂದು ಪರೀಕ್ಷಿಸುವುದು starter servicing ಮಾಡುವುದು.
(9) Nozzle cooling P/P motor ಆಗಿದೆಯೇ megger test, starter ಆಗಿದೆಯೇ servicing ಮಾಡಿರಬಹುದು.
(10) main switch board ಆಗಿದೆಯೇ switch ಆನ್: fuse ಆನ್: ಆಗಿರಬಹುದು ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(11) alternator, governor, slip ring, brush contact ಆನ್: ಆಗಿರಬಹುದು ಎಂದು.
(12) oxygen, motor ಆನ್: ಆಗಿ brush ಆನ್: ಆಗಿರಬಹುದು ಎಂದು.

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(13) main switch selector switch ಆಗಿದೆಯೇ amp, volt: ಆನ್: ಆಗಿರಬಹುದು ಎಂದು on load ಆಗಿದೆಯೇ ಇಲ್ಲವೇ ಪರೀಕ್ಷಿಸುವುದು.
(14) Prov ref. plant ಆಗಿದೆಯೇ motor, board ಆನ್: ಆಗಿರಬಹುದು ಎಂದು.
(15) steering indicator, E/R alarm, M/E alarm, telephone alarm ಆನ್: ಆಗಿರಬಹುದು ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(16) compressor motor ಆನ್: ಆಗಿರಬಹುದು ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(17) I/O, M/O heater ಆನ್: ಆಗಿ thermostat contact ಆನ್: ಆಗಿರಬಹುದು ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(18) coupler ಆನ್: ಆಗಿ alignment ಆಗಿರಬಹುದು ಎಂದು.
(19) CO_2 alarm ಆಗಿದೆಯೇ ಎಂದು.
(20) Bridge light ಆನ್:, control light wiring ಆನ್: ಆಗಿರಬಹುದು ಎಂದು.
(21) Store ಆಗಿದೆಯೇ ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(22) Deck cargo gear motor ಆನ್: ಆಗಿ corrosion ತಡೆಗಟ್ಟುವಿಕೆ Protection ಮಾಡಲಾಗಿದೆಯೇ ಎಂದು ಪರೀಕ್ಷಿಸುವುದು. FFA is fluid ಇರುವಿಕೆ ಪರೀಕ್ಷಿಸುವುದು. ಮತ್ತು ಸೋರಿಕೆ ಇಲ್ಲವೇ ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(23) spare motor ಆನ್: ಆಗಿ megger, servicing, brush check terminal connection check ಮಾಡುವುದು.
(24) Emergency ಆಗಿ changing ಮಾಡಿದೆಯೇ ಎಂದು ಪರೀಕ್ಷಿಸುವುದು. ಮತ್ತು ಸೋರಿಕೆ ಇಲ್ಲವೇ ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(25) ventilator ಆನ್: ಆಗಿರಬಹುದು ಎಂದು.
(26) work shop ಆಗಿ motor ಆನ್: ಆಗಿ ಮತ್ತು ಆಗಿರಬಹುದು ಎಂದು.
(27) Boiler feed P, D/O High P, motor ಆನ್: ಆಗಿರಬಹುದು ಎಂದು.
(28) wiring ಆನ್: ಆಗಿ master controller, windlass, capstan ಆಗಿದೆಯೇ master controller ಆನ್: ಆಗಿ ಮತ್ತು ಆಗಿರಬಹುದು ಎಂದು. servicing ಮಾಡಿರಬಹುದು ಎಂದು. disconnection checking ಮಾಡುವುದು.
(29) control unit ಆನ್: ಆಗಿರಬಹುದು ಎಂದು. board ಆನ್: ನ disconnecting ಆಗಿರುವಿಕೆ ಪರೀಕ್ಷಿಸುವುದು. relay ಆನ್: contactor ಆನ್: ಆಗಿರಬಹುದು ಎಂದು. ಯಾವುದೇ ಅಡಚಣೆ ಮಾಡಿರಬಹುದು ಎಂದು.
(30) Shifting stand by ಮಾಡುವುದು.
(31) Hydrophone Pressure switch, float switch, Pyrometer ಆಗಿರಬಹುದು ಎಂದು.
(32) extension lamp ಆನ್: ಆಗಿ ಸಂಪರ್ಕ ಪರೀಕ್ಷಿಸುವುದು. ಆಗಿರಬಹುದು ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(33) Electro cleaner ಆಗಿದೆಯೇ ಎಂದು ಪರೀಕ್ಷಿಸುವುದು.
(34) cold room, pilot light ಆನ್: ಆಗಿರಬಹುದು ಎಂದು.
(35) Crane motor ಆನ್: ನ brake ಆಗಿ ಸರಿಯಾಗಿ ಹೊಂದಿಸಿದೆಯೇ ಎಂದು ಪರೀಕ್ಷಿಸುವುದು. transductor unit ಆಗಿ ಹೊಂದಿಸುವುದು.
(36) Telephone system ಆಗಿರಬಹುದು ಎಂದು.

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(37) motor bearing ഗ്രീസ് ചെയ്യുക.
(38) spare brake coil ഉള്ളത് megger test ചെയ്ത് ഉറപ്പ് വരുത്തുക.
(39) controller steps ഉം, terminal box ഉള്ളിലെ loose connection ഉം പരിശോധിക്കുക.
(40) Indicating lamp ഉള്ളത് പരിശോധിക്കുക.
(41) മറ്റെന്തെങ്കിലും electric ആയ ഉപകരണങ്ങൾ ഉണ്ടെങ്കിൽ അവ പരിശോധിക്കുക.

(19) Take appropriate readings and complete power calculation terminates propulsion machinery

Study of Indicator card ചെയ്യുന്നു.

(20) Act efficiently watch keeper

(21) Store and Inventory system

Consumable
Expendable
Non expendable
Spare

SR NO	Part Name	unit	voyage R	C	B	Part No	Location	Remark

R: Received, C = consumption B = Balance.

- Location എന്നുള്ളിടത്ത് ഓരോന്നിന്റെയും സ്ഥാനം പറയുന്നു. ഉദാ: engine room, cargo hold, etc. ഓരോന്നിനും serial No യിൽ ഉള്ള ഒരു നമ്പർ ഉണ്ടായിരിക്കും. Serial no യെപ്പറ്റിയുള്ള Instruction ഓഫീസിൽ നിന്നും ലഭിക്കുന്നു. Part No യെപ്പറ്റിയുള്ള details spare list ലും ഉണ്ടായിരിക്കും. ഓഫീസറുടെ ഒപ്പ് ഓരോ voyage ന്റെയും ആരംഭത്തിലും അവസാനത്തിലും check ചെയ്യുന്നു. voyage ന്റെ ആരംഭത്തിൽ receive ചെയ്തതും consume ചെയ്തതുമായ balance ന്റെ check ചെയ്യുന്നു. balance വ്യത്യാസമുണ്ടെങ്കിൽ consume ചെയ്തതായി കാണിക്കുന്നു. ഏതു ഇനത്തിന്റെ balance ആണ് ഉള്ളത് എന്ന് remark ൽ കാണിക്കുന്നു.

Annual stock ൽ group no, description, balance എന്നിവ form ൽ ഉൾപ്പെടുത്തുന്നു. consumable, expendable, spare എന്നിവ വ്യത്യസ്തമായി കാണിക്കുന്നു.

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Life Boat Engine Operation 26-3-87

① ലൈഫ് ബോട്ടിലെ ഫ്രീയായ fuel oil, lubricating oil എന്നിവ പരിശോധിക്കുക.

② combustion ചെയ്യുന്നതിനുള്ള filter ഉം starting spray ഉം ശരിയാണോ എന്ന് നോക്കുക.

③ Fuel lever run position ൽ ആണോ എന്ന് നോക്കുക.

④ Fuel rack run ആയിരിക്കുന്നുണ്ടോ എന്ന് നോക്കുക.

⑤ എഞ്ചിൻ decompressor ഓഫ് ചെയ്യുക.
decompressor ഓഫ് ചെയ്യുന്നത് starting ആയിരിക്കുമ്പോൾ engine ന് ആവശ്യത്തിനുള്ള വേഗത ലഭിച്ചതിനുശേഷം ആയിരിക്കണം.

⑥ എഞ്ചിൻ Engine ൽ ഘടിപ്പിക്കുക.
Engine ന്റെ shaft ന്റെ അറ്റത്തുള്ള coupling ൽ ഘടിപ്പിക്കുക. Inertia effect ഉപയോഗിച്ച് engine start ചെയ്യുന്നു.

⑦ എഞ്ചിൻ decompressor ഓഫ് ചെയ്യുക. engine ന് ആവശ്യത്തിനുള്ള വേഗത ലഭിച്ചതിനുശേഷം fuel ഓൺ ചെയ്യുക.

⑧ ഫോർവേഡ് അല്ലെങ്കിൽ gear ഉപയോഗിച്ച് propeller shaft ഘടിപ്പിക്കുക.

⑨ Life boat engine ന് life saving appliance ആയതുകൊണ്ട് ഇതിന് ആവശ്യത്തിനുള്ള fuel tank, lubricating tank എന്നിവ ഉണ്ടായിരിക്കുന്നതാണ്. ഇതിന് പുറമെ engine ന് ആവശ്യമായ cooling system ഉം ഉണ്ടായിരിക്കുന്നതാണ്.

28/3/87

Annual stock Taking sheet

MV ✓
Department ✓
Date ✓

consumable
Expandable
non expandable
spare

SR NO	Description	unit	Stock Out of	value		Remark
				R	P	
✓	✓	✓				

master
MV/SS

Head of Department

L/O, F/O [illegible]

Lub oil, F/O [illegible] actual, official [illegible] voy [illegible]

CHIEF ENGINEER'S FUEL AND LUB OILS REPORT

MV/ —— VOY —— (From —— To ——)

PORT	Arrival date hr. min	Depart ure date hr. min	Time in port days and decimal of day	Consumption in port including pilotage in port: Boiler F-O m-ton	Diesel F-O m-ton	Bearing L-O [illegible]	Cyl L/O lit	Steaming time day and decimal of day	Distance bet. pilot station in mile	Speed in knot	RPM	Consumption at sea and during long pilotage: Boiler F-O m-ton	Diesel F-O m-ton	Bearing L-O [illegible]	Cyl L/O lit	Remark
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Total (not including mileage)																
Average per day			X					X	X	X	X	X				Date / C/E

Summary

	Port	Date	Boiler F.O m-ton	Diesel F.O m-ton	Bearing L/O lit	Cyl L/O lit
Beginning of voyage						
Received						
"						
Total						
Consumed during voy.						

Arrival Time - Time of 'End of Passage' after passage

Departure Time - Time of following

Shifting berth in port to be [illegible]

[illegible] 29/5/87

Main Engine Working Principle

20-3-87

① [illegible]

② Lub: and cooling oil system [illegible], water cooling [illegible], lubricating, cooling equipment [illegible]

③ Charging air [illegible] air starting [illegible]
(a) starting control system
(b) supercharging equipment & arrangement system, scavenging equipment

④ Fuel injection [illegible] system, exhaust

⑤ Power transmission equipment [illegible]
cam, camshaft, roller, rocker arm, other

⑥ [illegible] mechanism

⑦ [illegible] speed control, [illegible] watch keeping.

[illegible]
(marine Diesel engine [illegible])

① (1) Jacket cooling water [illegible] discharge [illegible] warm water [illegible] fresh water cooler [illegible] by pass [illegible]

(2) H/O, D/O high tank, service tank [illegible] fuel [illegible] check [illegible]

(3) fuel oil flow pressure [illegible] filter [illegible] (1020 → 1050 [illegible]) fuel service P/P D/O high [illegible] P/P [illegible]

(4) L/O filter [illegible]

(5) L/O P/P [illegible] stand [illegible] P/P Pr: inlet 55 Hg, outlet 2.64 kg/cm²

(6) Turbo oil pump [illegible] (cocky [illegible]) Auto clean filter [illegible]

(7) Thrust pressure 1.35, Temp. 30°C [illegible]

(8) Turning gear [illegible] gland [illegible]

(xi) propeller speed indicator fitted,
(xii) Turning gear engaging lever fitted at exhaust side of cylinder liner
Emergency hand pumping for primer fitted at exhaust side of engine
(xiii) Pipe, joint, Plunger, starting hose etc. are kept in locker
(xiv) governing speed is 2 speed fitted
(xv) Booster pump fitted for 2 stroke engine
(xvi) Indicator cock type fitted
(xvii) air compressor type is 2 stage pressure (reciprocating) type
approx. reservoir capacity fitted.
(xviii) air lubricator type fitted
(xix) Crank case blow out valve fitted in each cylinder
(xx) Engine fuel lever at governor side fitted

Answer

(3) (i) Ho pump, Reversing tank, Reverse main coolers, Heater, Piston cooling pipe, Crankshaft bearing pipe, Thrust block pipe, camshaft service tank, camshaft pipe etc are

Ref cyl. direction, cyl. liner temperature, cyl. liner water outlet temperature

Temperature in deg.	Unit
40	Exhaust gas
not more than 460	gas

Turbocharger turbo oil inlet temperature, turbo oil pressure, Engine lubricating oil pressure, turbocharger speed, turbocharger exhaust gas temperature, turbocharger air inlet temperature, lubricating oil filter inlet pressure

(ii) water cooling

Temperature of cooler water, Engine jacket cooler adjusting valve, water inlet temperature

(3) nozzle cooling, Thrust nozzle cooling pump, Thrust nozzle cooling inlet temperature

Engine cooler water inlet temperature

In 54 out 63

Inlet out

(2) Charging air, air starting

Starting air

Air receiver is provided with a drain pipe at lower end, which is used to drain off moisture. air starting valve, operated by camshaft through tappet rod, rocker arm, pilot valve and servo piston.

Starting air valve is connected to air receiver and main starting valve.

air starting valve is closed when engine is running.

(3) Starting control system.

Starting lever is connected to air pilot valve which is fitted on pilot air receiver by starting valve. Starting air control valve, auto valve, servo piston, engine starting valve is also consisting of - shaft, cams, connecting rods

Fuel Injection

Fuel pumps discharge metering of fuel oil per cycle depending upon fuel oil control system fuel valve opening.

Pressure of fuel oil in fuel oil filter, fuel oil pump, fuel oil inlet pressure, fuel oil outlet pressure

- fuel pump is provided to maintain amount of fuel lever position. Pipe is connected from discharge of pump to fuel injection pump. fuel pump inlet, discharge pressure, camshaft, eccentric shaft, governor

Governor

Governing of fuel speed by fuel lever 40 degree angle of engine 40 with 0.26, 0.6 engine and engine 40 degree not of temp. (exh.) of E.G.B. max 405° C not 350 C fuel lever 40 to 40 or 40 to 40 engine

Fuel injection valve

Fuel pump ൽനിന്നുള്ള high pressure oil ഉം nozzle ന്റെ needle valve ന്റെ മേലുള്ള spring ന്റെ force ഉം fuel oil injection ചെയ്യുന്നു. injection pressure ന്റെ increase spring action ന്റെ by pass ചെയ്യുന്നു. combustion ന്റെ fuel ന്റെ amount governor ന്റെ control ചെയ്യുന്നു. fuel ന്റെ amount governor ന്റെ engine speed, rpm ന്റെ variation fuel lever ന്റെ control ചെയ്യുന്നു. engine load increase ചെയ്യുമ്പോൾ governor ന്റെ dead weight centrifugal force ന്റെ move away ചെയ്യുന്നു. fuel pump eccentric ring ന്റെ by pass ചെയ്യുന്നു. fuel amount regulate ചെയ്യുന്നു.

cylinder ൽ combustion ന്റെ ശേഷം valve ന്റെ pressure ന്റെ crankshaft ഉം ശേഷം camshaft ഉം, scavenging air ന്റെ pressure ന്റെ ശേഷം valve ന്റെ open ചെയ്യുന്നു. supercharging ന്റെ ശേഷം air ന്റെ pressure 1.8 kg/cm² ൽ fuel injection valve ന്റെ test ചെയ്യുന്നു.

Supercharging

Turbo blower ന്റെ turbine side ന്റെ engine ന്റെ exhaust ന്റെ, blower side ന്റെ air filter ലൂടെ air ന്റെ cooler ലൂടെ scavenging air belt, (fire, receiver, all) ന്റെ engine ന്റെ engine cylinder ൽ exhaust gas ന്റെ exhaust gas manifold, turbine, exhaust gas boiler ന്റെ funnel ലൂടെ പുറത്തേക്ക് പോകുന്നു.

Receiver

Air cooler F 61 A 64
SW 34 , Offset: 46, 37, 45

Turbocharger	F	A
Temp	310	220
Tc	60	58

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Main Engine working Principle.

(1) main Engine ന്റെ starting air system
(2) starting air system

Exhaust

Exhaust valve ന്റെ rocker arm ന്റെ camshaft ന്റെ, roller ന്റെ valve ന്റെ push ചെയ്യുന്നു.
tappet clearance ⇒ mm (feeler gauge ഉപയോഗിച്ച് set ചെയ്യുന്നു.)
exhaust flap ന്റെ ശേഷം fuel ന്റെ supply ചെയ്യുന്നു.

(5) Power Transmission Equipments

crankshaft ന്റെ piston connecting rod ന്റെ, roller ന്റെ camshaft, rocker arm ന്റെ push ചെയ്യുന്നു. rocker arm ന്റെ exhaust valve ന്റെ open ചെയ്യുന്നു. camshaft ന്റെ fuel pump ന്റെ timing ന്റെ set ചെയ്യുന്നു. crankshaft ന്റെ gear box ന്റെ ശേഷം forward, reverse gear change ചെയ്യുന്നു.

Diesel engine power transmission Installation

Propeller ന്റെ direction rotation change ചെയ്യുന്നു, reduction of gearing ന്റെ engine ന്റെ rotation ന്റെ good efficiency ന്റെ ശേഷം reduction gearing ന്റെ main shaft ന്റെ gear box ന്റെ propeller shaft ന്റെ Thurst Bear → 1.3, Temp Sensor ന്റെ gland ന്റെ Form seal ചെയ്യുന്നു.
Bearing 1.2

(6) speed ന്റെ fuel lever ന്റെ, governor ന്റെ fuel pump ന്റെ fuel ന്റെ speed ന്റെ control ചെയ്യുന്നു.
(Main engine ന്റെ fuel injection pump, fuel injection valve governor, fuel filters, etc. ന്റെ maintain ചെയ്യുന്നു.)
Lub oil circuit - Main ① governor, pressure gauge, Piston pin, bearing, Cam casing, oil main, crank pin main bearing, oil cooler, thrust bearing, oil filter, pump suction filter ന്റെ. ന്റെ main oil

cooling system: connecting pipe, H/O cooler cooling water discharge pipe, suction pipe, Pip. Jt, ಅಂಚಿನ ಹೆಚ್ಚಳ ಇರಬಾರದು
nozzle cooling ಗೆ ಹೋಗಿ, High Pr ಆಗಿ pipe ಗಳು ಸೋರಬಾರದು
Cyl: Jt, (about 56) SL 5Y
nozzle cooler, cooling water ಸರಿಯಾಗಿ 3, 4] ಆಗಿರಬೇಕು
ಮತ್ತು Turbo cooler ಗಳಲ್ಲಿ water 52 → 54 ಆಗಿರಬೇಕು
ಇರಬೇಕು
Scavenging ಅಲ್ಲಿ ① Exhaust port ② cylinder ③ scavenging port ④ air port ⑤ suction V/v ಅಂಚಿನ ಹಾಗಿರಬೇಕು

M/E watch keeping

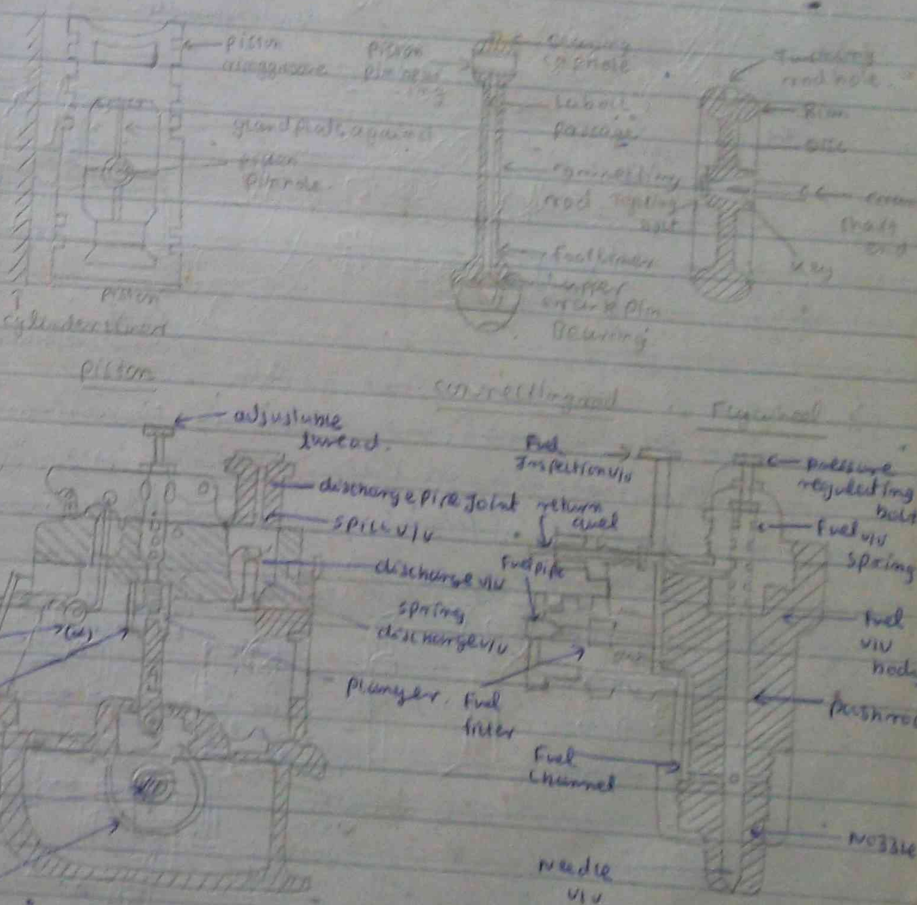
① Exhaust temp: ಅನ್ನು ಅಲ್ಲಲ್ಲಿ ಇರುವಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು; ಏನಾದರೂ increase rate (ಅಥವಾ) ಇಳಿಕೆಯಾದರೆ fuel lever ಅನ್ನು ಕಡಿಮೆ ಮಾಡಬೇಕು
② High Pr level ಅನ್ನು ಸರಿಯಾಗಿ ಇರಿಸಿಕೊಳ್ಳಬೇಕು
③ nozzle cooling, T/O cooler ಗಳಲ್ಲಿ ನೀರಿನ ಒತ್ತಡ: 2 ಇರಬೇಕು
④ Bearing pressure, thrust pr; temp ಗಳು ಸರಿಯಾಗಿ ಇರಬೇಕು
⑤ Jt ಗಳಲ್ಲಿ ಆಯಿಲ್, piston ಗಳಲ್ಲಿ ಆಯಿಲ್ ಮತ್ತು cooler ಗಳಲ್ಲಿ ಸೋರಬಾರದು
⑥ F/W, S/W cooling pipe ಗಳಲ್ಲಿ ನೀರಿನ ಒತ್ತಡ: 2 ಇರಬೇಕು
⑦ oil tank ಗಳಲ್ಲಿ ಆಯಿಲ್ ಲೆವೆಲ್ ಅನ್ನು ಸರಿಯಾಗಿ ಇಟ್ಟುಕೊಳ್ಳಬೇಕು
⑧ connecting ಪೈಪ್‌ಗಳಲ್ಲಿ ಆಯಿಲ್ ಲೀಕ್ ಆಗಬಾರದು
⑨ alum pipe ನಲ್ಲಿ ನೀರಿನ ಒತ್ತಡ: 1 ಇರಬೇಕು
⑩ Scav: air, air cooler ಗಳ ಪ temp: ಅನ್ನು ಸರಿಯಾಗಿ ಇರಬೇಕು
⑪ Heater ನ ಸುತ್ತಲಿನ ತಾಪಮಾನ 60: ಇರಬೇಕು
⑫ H/O end heater P/P ಗಳನ್ನು ಆಫ್ ಮಾಡಬೇಕು
⑬ cyl: discharge ಅನ್ನು ಆಯಿಲ್ ಪೂರ್ತಿ ತೆರೆದಿರಬೇಕು
⑭ ಎಂಜಿನ್: ಗಳಲ್ಲಿ ಆಯಿಲ್ ಲೀಕ್ ಆಗದಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು

29/3/87

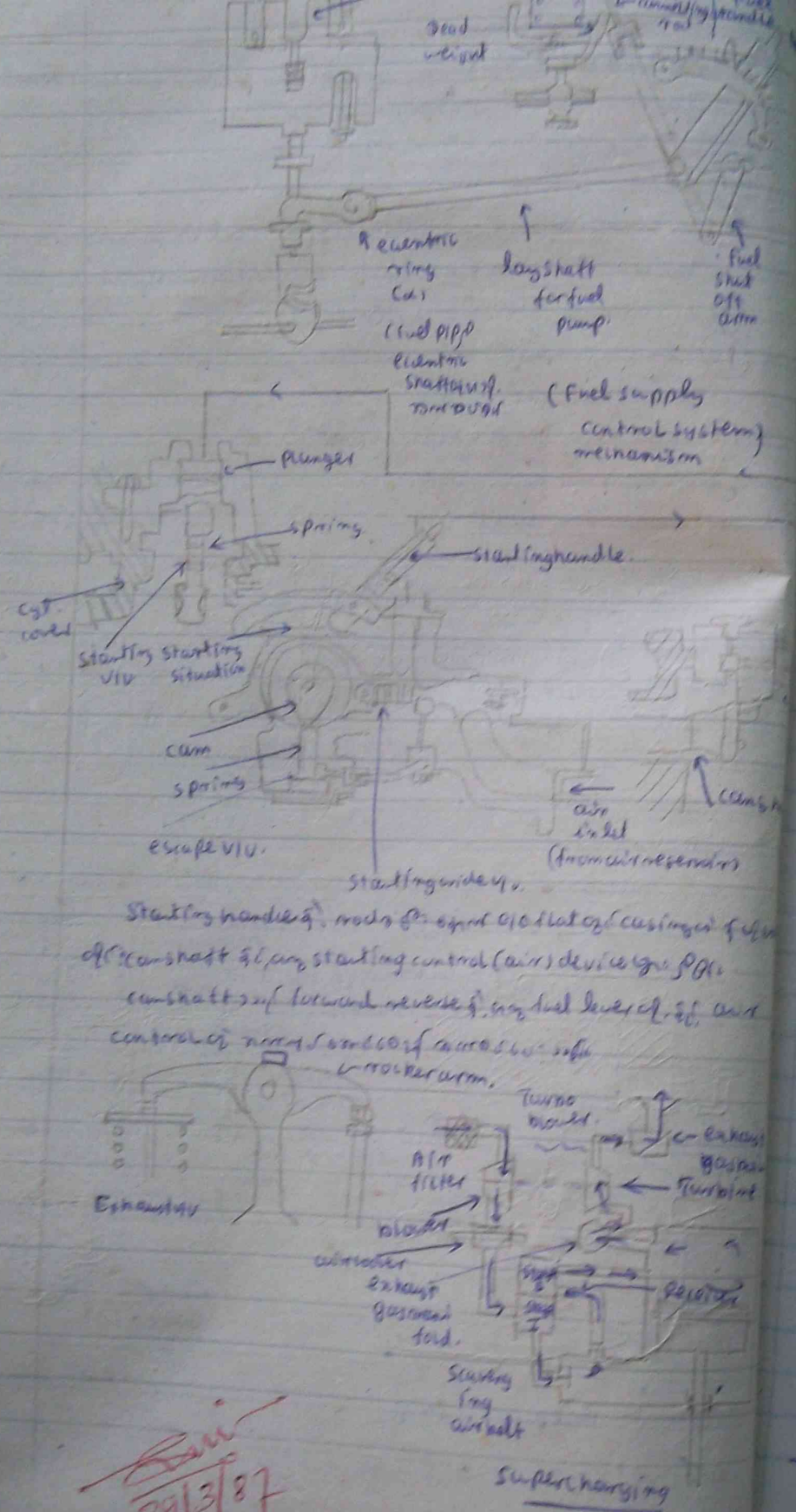
main engine ಅವಲೋಕನ

① cyl: lubricator, cyl Jt, cam-shaft cooling ಇವುಗಳಿಗೆ T/O ——— cooler ನಿಂದ ನೀರು ಸರಿಯಾಗಿ ಹೋಗುತ್ತಿದೆಯೇ
Jt ನಿಂದ sw ——→ ಹೊರಗೆ
——— sw ——→ sw
② Scav: air temp: ಸರಿಯಾಗಿದೆ, fuel ಗೆ P/P pr:, boiler ನಲ್ಲಿ: ಎಂಜಿನ್ ಅಂಚಿನಲ್ಲಿ ಅಳವಡಿಸಿರುವ air cooler ನಿಂದ ಬರುವ ಗಾಳಿಯ ತಾಪಮಾನ ಸರಿಯಾಗಿದೆ
③ Turn over ಮಾಡಿ: ಕಂಡುಕೊಳ್ಳಲಾಗಿದೆ
④ ಸಿಲಿಂಡರ್, ಜಾಕೆಟ್, ಸಿಲಿಂಡರ್ ಹೆಡ್, ಪಿಸ್ಟನ್ ಮತ್ತು ಸ್ಟಫಿಂಗ್ ಬಾಕ್ಸ್ ಗಳಲ್ಲಿ ನೀರಿನ ಒತ್ತಡ ಸರಿಯಾಗಿದೆ
⑭ Exhaust ಪೈಪ್: ಗಳಲ್ಲಿ ನೀರಿನ ಸೋರಿಕೆ ಇರುವುದಿಲ್ಲ
⑮ cooler ನಲ್ಲಿ ಒತ್ತಡ: 2 ಇದೆ

Diagrams



29/3/87



Starting handle ന്റെ rod ൽ ഘടിപ്പിച്ചിരിക്കുന്ന cam camshaft ന്റെ cam ന്റെ starting control (air) device ലുള്ള camshaft നെ forward reverse ചെയ്യുന്നു fuel lever ന്റെ air control ന്റെ rocker arm ൽ cam ന്റെ roller ഉരുണ്ട് valve തുറക്കുന്നു

Supercharging

29/3/87

4 to 8 watch.
(Freon leak detector)

Wed
22.3.89
(Monday)

- Main ന്റെ Starting valve, Joint ഇവയിൽ നിന്നും Gas ചോരുന്നുണ്ടോ എന്ന് പരിശോധിക്കുന്നു
- Fridge compressor ന്റെ belt tension
- Screw ൽ air regulator ന്റെ oil level
- Leak detector ഉപയോഗിച്ച് Gas ചോർച്ച കണ്ടുപിടിക്കുന്നു
- regulator ൽ നിന്നും gas ചോർച്ച
- fridge ന്റെ വാതിൽ Freon joint ഇവ ശ്രദ്ധിക്കുക
- Leak detector ഉപയോഗിച്ച് joint, Parking, Main valve ഇവിടെ gas ചോർച്ച പരിശോധിക്കുന്നു

29/3/87

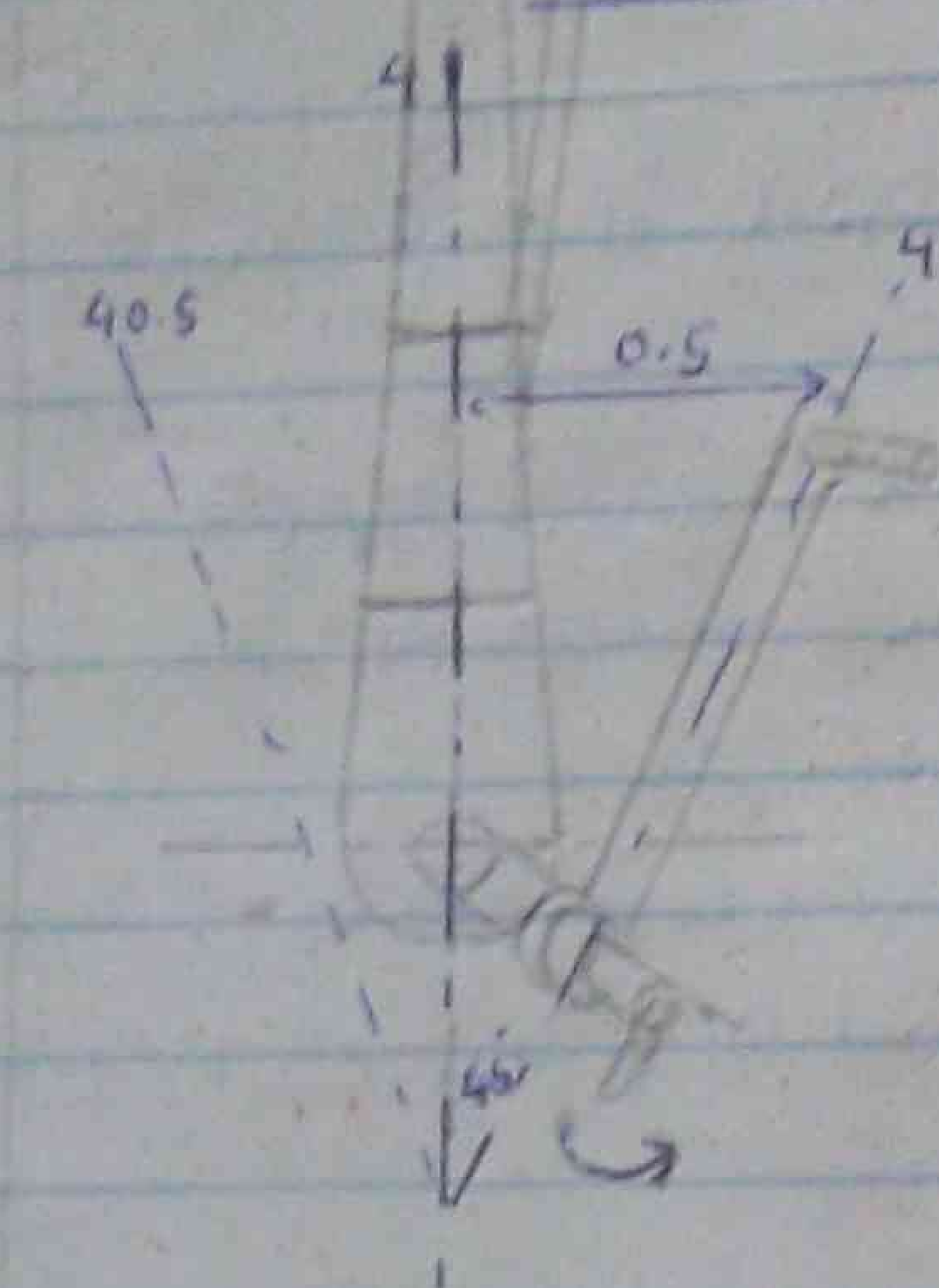
Generator Engine ಸ್ಟಾರ್ಟ್ ಮಾಡುವ ವಿಧಾನ: — voy-102, 22-3-87 (Sunday)

① ಪ್ರಥಮವಾಗಿ ಸಂಪ್ ಟ್ಯಾಂಕ್ ಲೆವೆಲ್ L-O sump level ಅನ್ನು ಚೆಕ್ ಮಾಡಬೇಕು
ಲೆವೆಲ್ ಕಡಿಮೆ ಇದ್ದಲ್ಲಿ level ತುಂಬಿಸಬೇಕು
(L.O visco ಪುಟ ನೋಡಿ)
② Flywheel ನ ಎಡಭಾಗದಲ್ಲಿ: L-O Hand P/P ಇರುತ್ತದೆ, ಪ್ರೈಮ್ ಮಾಡಬೇಕು
③ L/O ಯಿಂದ crankshaft, main, connecting bearings ಇವುಗಳಿಗೆ ಲೂಬ್ರಿಕೇಷನ್ ಆಗುತ್ತದೆ
④ Fuel inlet V/V, Jacket cooling F.W V/V, L/O, air cooler cooling SW V/Vs (inlet & outlet) ಇವುಗಳನ್ನು ತೆರೆಯಬೇಕು
Indicator cock ಇವುಗಳನ್ನು ತೆರೆಯಬೇಕು
⑤ Air V/V ನ್ನು ತೆರೆಯಬೇಕು
⑥ blow out ಮಾಡಬೇಕು
⑦ G/E ಯ indicator cock ಗಳನ್ನು ತೆರೆದಿಟ್ಟು fuel lever ನ್ನು start ಸ್ಥಾನದಲ್ಲಿ: starting air ನ ಪ್ರೆಷರ್ ಜಾಸ್ತಿ: ಆಗುವುದು: fuel lever ನ್ನು running position ಗೆ ತರಬೇಕು.
⑧ Crk. Tep, Jac Temp, L/O, F/W, S/W Pr: RPM ಇವುಗಳು: ಸರಿ: Load ಆಗಿದೆಯಾ
⑨ Load ಆಗಿ, G/E ಯ synchroscope ನ್ನು ಗಮನಿಸಿ ಸ್ಟೀಮ್ ಪವರ್ volt, rpm, freq: ಗಳು ಸರಿ ಇದೆಯೆ ಎಂದು
⑩ freq: ಕಡಿಮೆ ಇದ್ದಲ್ಲಿ governor ಅನ್ನು clockwise ತಿರುಗಿಸಿ. ಹೆಚ್ಚಾಗಿದ್ದಲ್ಲಿ anti clockwise ತಿರುಗಿಸಿ, Syn: ಆಗಿದೆಯೆಂದು ಖಚಿತಪಡಿಸಿಕೊಂಡು Load ಮಾಡಬೇಕು
⑪ Load ನ್ನು freq: ಗೆ ತಕ್ಕಂತೆ ಹೆಚ್ಚಿಸಬೇಕು

Compressor ಬಗ್ಗೆ ತಿಳಿಯಿರಿ: — 23-3-87

① Lub oil sump, Jacket cooling V/V High pressure, low pressure drain valve ಇವುಗಳನ್ನು, piston cooling drip oiler ನ drip position ಗಳನ್ನು ನೋಡಬೇಕು
② air receiver inlet, air compressor out let ನ್ನು ಪರೀಕ್ಷಿಸಬೇಕು
③ Load ನ ಆರಂಭದಲ್ಲಿ compressor load ಆಗುವುದನ್ನು ಗಮನಿಸಿ breaker ಗಳನ್ನು: air compressor ನ ಆರಂಭಿಸಬೇಕು
④ Low pressure valve ನ ಅಂದರೆ, start button ನ್ನು ಪ್ರೆಸ್ ಮಾಡಿ (starting Load ಆಗುವುದು, ತಿರುಗಿಸಿಕೊಳ್ಳಬೇಕು
⑤ ಪ್ರತಿದಿನ low pressure valve ನ್ನು ತೆರೆದು air drain V/V ನ್ನು ಎಲ್ಲಾ ಟ್ಯಾಂಕ್‌ಗಳಲ್ಲಿರುವ ನೀರನ್ನು ತೆಗೆಯಬೇಕು (water drain & Load reduce)
⑥ drip oiler ಗೆ Lub oil ತುಂಬಿಸಬೇಕು
⑦ ಒಳಗೆ: ಗೆ: ಬಂದ air drain V/V ಗಳನ್ನು ಬಿಗಿಯಾಗಿ stop button ಪ್ರೆಸ್ ಮಾಡಿ air receiver, air comp: ಗಳಿಗೆ ತೆರಳಿದ drip ನ shut ಮಾಡಬೇಕು

Fuel Lever [illegible] 23-3-87



Fuel lever [illegible]

(1) Lock nut [illegible]

(2) 45 [illegible]

(3) [illegible] $\frac{0.5}{45}$ [illegible] 41 [illegible]

41 + 0.5 = 41.5 [illegible]

(4) [illegible] 42 [illegible] 0.5 [illegible] 41.5 ~ 100 [illegible]

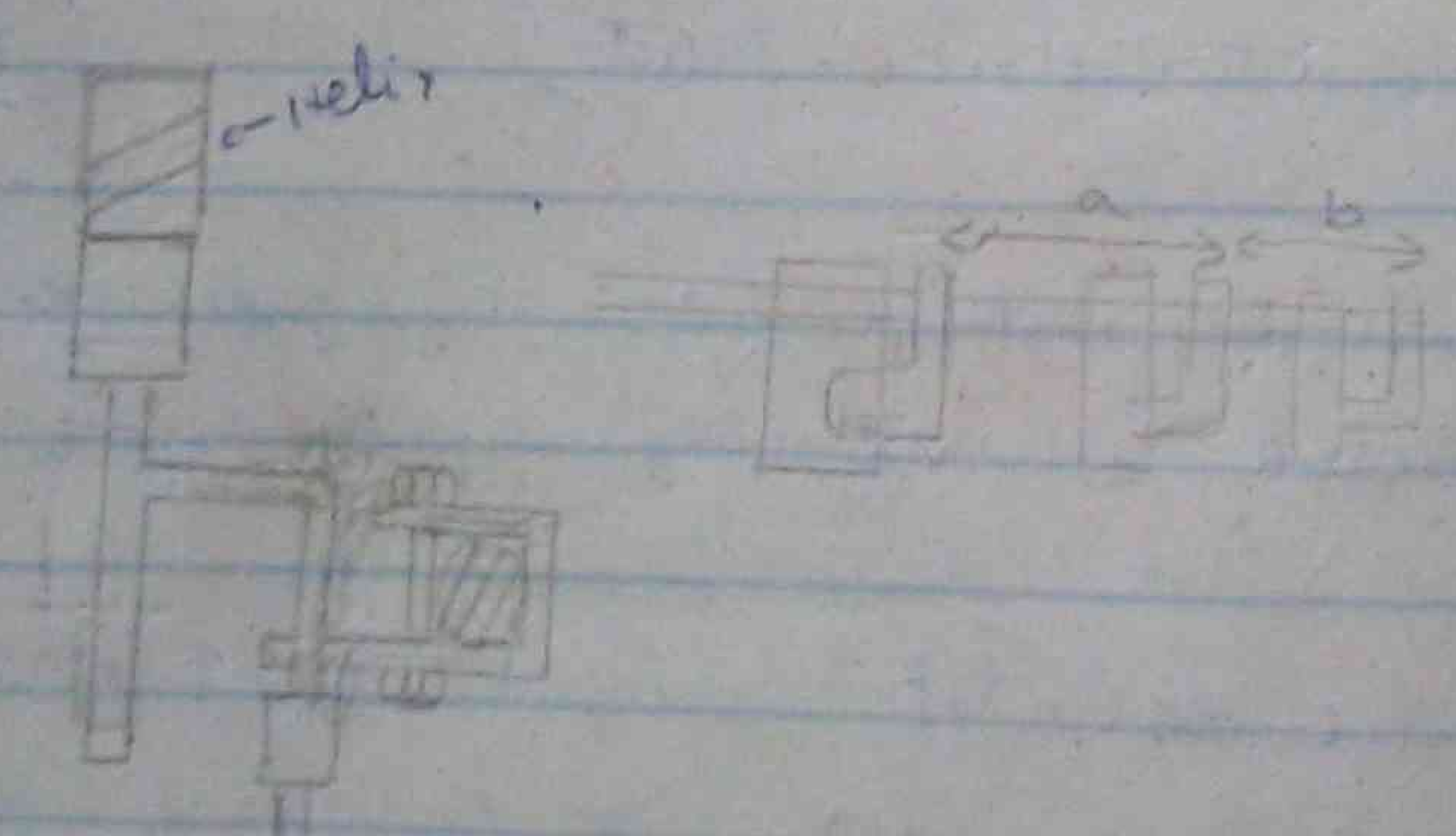
(5) Fuel priming valve [illegible] scale [illegible] 41.5 [illegible]

(6) Fuel lever [illegible] temp: [illegible] max 405 [illegible]

24-3-87

No 2 GE [illegible] (No 3) unit [illegible] temperature [illegible]

[illegible] (asst: to 1st Engineer)



Fuel [illegible]

(1) Bolt [illegible] No 10 ring, open spanner [illegible]

(2) [illegible] spanner [illegible] flywheel [illegible]

(3) [illegible] bolt [illegible]

(4) [illegible] temp: (240°C) [illegible] (300°C)

[illegible] 27/3/87

Voy 102
@ sea

(Synchronizing [illegible])

22-3-87
(Sunday)

Black out [illegible] generator [illegible] Load [illegible]

① Pilot lamp [illegible] voltage [illegible] freq [illegible] Indicator [illegible] selector switch [illegible] GE_1 GE_2 GE_3 [illegible] gen [illegible]

② Voltage Regulator [illegible] Built up voltage [illegible] (N = rpm, f = cycle/sec (Hz) P = No: of Poles)

③ (Speed control $N = \frac{120f}{P}$ [illegible] → $f = \frac{PN}{120}$ [illegible] governor [illegible] rpm (speed) [illegible] adjust [illegible] freq: [illegible] 50 Hz [illegible])

④ [illegible] (Blackout) [illegible] Sym: [illegible]

⑤ [illegible] speed, voltage [illegible] Load [illegible]

[illegible] Load [illegible]

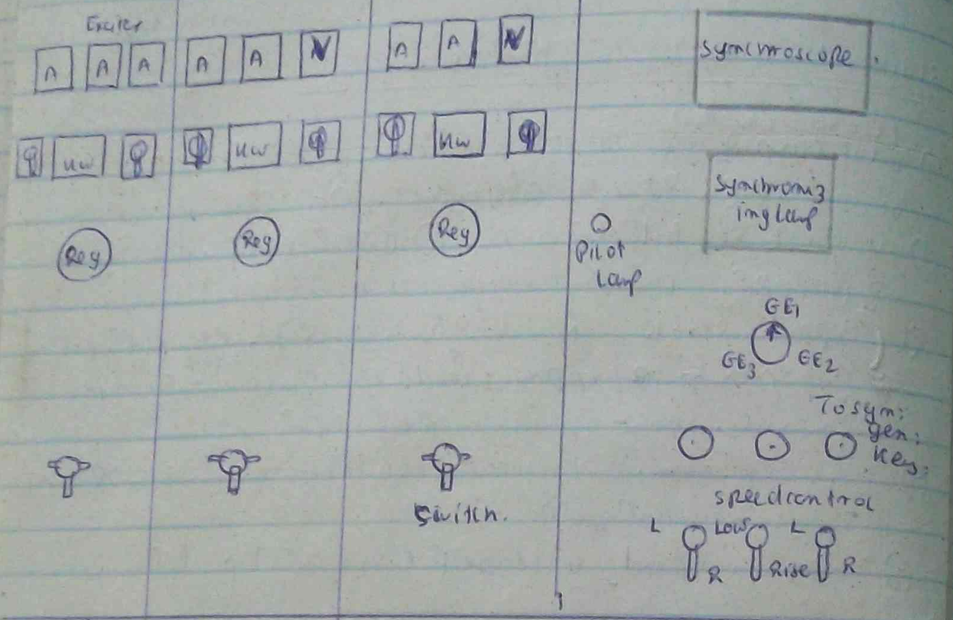
① GE_1 [illegible] G_1 G_3 [illegible] Parallel operation [illegible] GE_3 [illegible] regulator [illegible] 380 V [illegible] To sym: gen: [illegible]

② Pilot lamp [illegible] (GE_1, GE_2, GE_3) selector switch [illegible] generator [illegible] (GE_3) [illegible]

③ [illegible] synchroscope [illegible] gen 3 [illegible] Built up voltage [illegible] regulator [illegible]

④ Synchro speed control [illegible] freq: [illegible] [illegible] synchroscope [illegible] (clockwise) [illegible] freq: [illegible] 50 Hz [illegible] switch for GE_3 [illegible] Load [illegible]

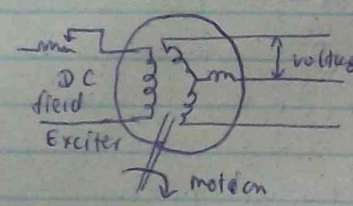
⑤ [illegible] Busbar [illegible] Load [illegible] Share [illegible] GE_1 [illegible] GE_3 [illegible] GE_1 speed control [illegible] GE_3 speed control [illegible] KW meter [illegible] Parallel [illegible] Load [illegible] Load zero [illegible] speed control [illegible]



• ജനറേറ്ററിലെ വോൾട്ടേജ് നിയന്ത്രിക്കുന്നത്:

(1) voltage regulator ഉപയോഗിച്ച് voltage കൂട്ടുന്നു.

Built up voltage ഉണ്ടാകുന്നതിന് commutator ന് പകരം slip ring



DC field (ചുറ്റുമുള്ള AC ഉള്ള wdg: ന്റെ മുഴുവൻ ഭാഗവും wdg: ന് voltage ഉണ്ടാകുന്നതിനാൽ ഇതിലെ exciter ന്റെ checking മുഴുവൻ ഉണ്ട്.

(ചുരുക്കം: ഇതിലെ commutator ഉണ്ടാകുന്നു)

(2) frequency യിലെ മാറ്റം നിയന്ത്രിക്കുന്നു:

$f = \frac{NP}{120}$ ie $f \propto N$

frequency ∝ speed ഇതിന് speed ന്റെ governor ഉപയോഗിച്ച് governor ന്റെ adjusting screw ഉപയോഗിച്ച് governor ലെ electric control or adjust discrepancy

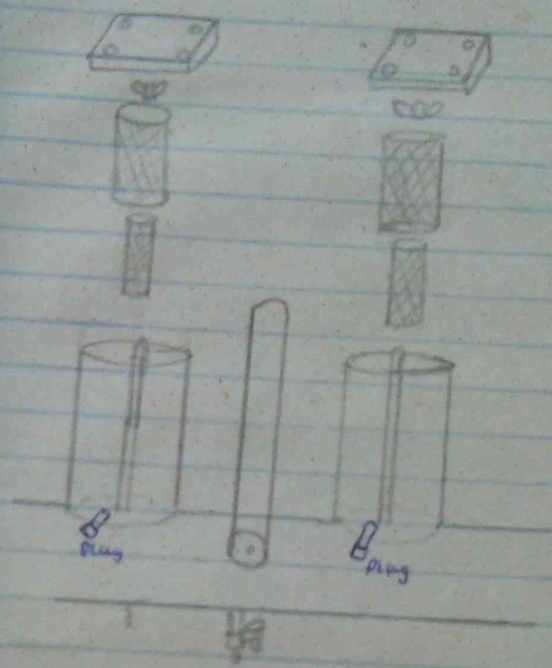
ഉണ്ടാകുന്ന (1) Synchronizing lamp ഉപയോഗിച്ച് all dark method ആണ്. two ends ലെ synchronoscope ഉപയോഗിച്ച് E/E ന്റെ operation voltage ന് equal & opposite vector ഉണ്ടാകുമ്പോൾ resultant ഉണ്ടാകുന്നു. all dark ഉണ്ടാകുന്നു (ഇത് opposite ഉണ്ടാകുന്നതിനാൽ ആണ്)

(2) ആദ്യത്തെ ഉപയോഗിച്ച് (all bright) ഉണ്ടാകുന്നു Load ചെയ്യുമ്പോൾ vector ന് same direction ൽ ആണെങ്കിൽ same direction ഉണ്ടാകുന്നതിനാൽ resultant ചെയ്യുമ്പോൾ ഉണ്ടാകുന്നു.

Date and place	working	Remark
1-3-87 (sunday) (At-sea)	Helping the C/E paperworks ✓	
2-3-87 (monday) At-sea	Peasant Day (Holiday) ✓	
3-3-87 (Tuesday) At-sea	- Study of Typical joints in Engine Room - Generator Engine fuel pump air purge non return valve overhaul. ✓ - 12 to 4 watch keeping ✓	
4-3-87 (wendsday) Arrival mangalore Pilot	- Making the boiler water test ✓ - Helping the second Engineer in checking the store at 12→4 watch keeping ✓	
5-3-87 (Thursday) Arrival mangalore Port.	- Checking the store {assassinant to 3/E} ✓ - Arrival Stand By Duty ✓	
6-3-87 (Friday) At mangalore	- Checking the M/E spare parts store {assassinant to 1/E} ✓	
7-3-87 (saturday) At mangalore	-	
8-3-87 (sunday) At mangalore	Holiday	
9-3-87 (mon) (mangalore)	- Disassembling the fuel valves of No 3 generator Engine, Nozzle testing and servicing, refitting, adjusting the tappet, timing due to firing order and test run. - Searching the discontinuity of No 1&2 winch motor brake circuit, replacing the brake coil and test run.	

14-3-27.

Turbo oil filter diagram:



(Lever ની ઝાડમાં જે ભાગ
ઉપરની તરફ જાય છે
તે ભાગમાં ઉપરની તરફ
જે ભાગમાં નીચે તરફ
જાય છે)

- filter ની ઉપરની બાજુથી ઉપરના ભાગમાં
- ની નીચેના ભાગમાં
- અંદરનો ભાગ
- ઉપરનો ભાગ
- જે ને જુદા કરો (screw ની જે, plug ની જે)
- ઉપરનો ભાગ ઉપર ચઢાવો.
- test run માં જો ઓઈલ ની લાઈટ બંધ થઈ જાય તો
ફરીવાર ચાલુ કરો.

(Emergency fire pump, Lifeboat engine, Energency engines)

SPATE PUMP

18-2-87

Operation

(1) fuel Tank (E) ന്റെ ടാപ്പ് തുറക്കുക

(2) sump ന്റെ L/O ലെവൽ stick ന്റെ high level mark

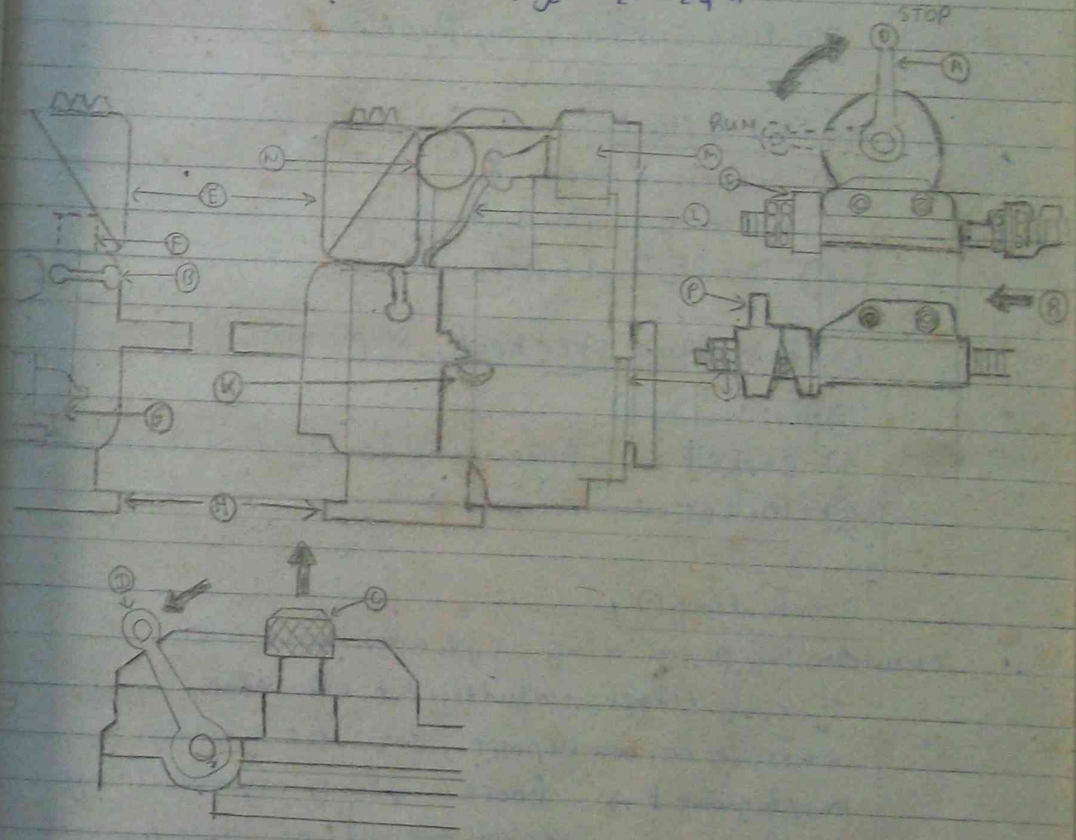
(3) control linkage ഭാഗങ്ങൾ lubricate ചെയ്യുക

(4) Stop / Run lever (A) ന്റെ Run സ്ഥാനത്തേക്ക് മാറ്റുക

(5) Decompressor lever (D) ന്റെ stop സ്ഥാനത്തേക്ക് (over over സ്ഥാനത്തേക്ക് മാറ്റുക, engine start ആകുമ്പോൾ മാത്രം) over ന്റെ ഭാഗത്തേക്ക് മാറ്റുക

(6) Engine ന്റെ lever ഉപയോഗിച്ച് start ചെയ്യുക. (പിടി തിരിക്കുമ്പോൾ ഇടതുവശത്തേക്ക് തിരിക്കുക)

(7) ശേഷം decompressor ന്റെ lever താഴ്ത്തുക



Tostant Engine.

(1) air cleaner ൽ, fan inlet ന്റെ ventilation opening ൽ ഒന്നും ചേർക്കരുത്

(2) oil, fuel level ന്റെ പരിശോധിച്ച് ആവശ്യമെങ്കിൽ ഉയർത്തുക

(3) Engine ന്റെ Load ന്റെ വ്യത്യാസപ്പെടുത്തുക.

(4) Stop/Run lever (A) ന്റെ RUN ൽ ഉറപ്പിക്കുക.

(5) cam lever (P) ന്റെ Running position (R) ൽ ഉറപ്പിക്കുക.

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adjustment (or) lever ன் push down ஆகும் வரை over load stop lever (B) ன் release ஆகும் வரை

Rope start ஆரம்பித்த பின் starting pulley (J) ன் மீது rope ஐ ஒரு முறை opposite direction ல் rope ன் முனையை compression stroke ன் position ல் நிறுத்த வேண்டும்.

To stop the engine

ஒரு முறை stop/run lever (A) ஐ stop என்ற இடத்திற்கு (decompressor lever ஐ அழுத்த வேண்டும்)

Starting and Running Problems.

(1) fail to start

(a) Excessive drag *
(b) lack of compression △
(c) Faulty fuel supply. ‡

(2) lack of power, over heat, stop

(a) overheating ⊙
(b) choked air cleaner (or) faulty fuel supply ±
(c) lack of compression. △

overheating ⊙

Excessive bearing, piston ring, cylinder bore wear sticking valves, insufficient clearence. excessive carbon deposit, Incorrect timing. misalignment → loose coupling or mounting bolts (or) unstable mounting frame work

* caused by incorrect grade of lubricating oil (or) residual load from driven machinery

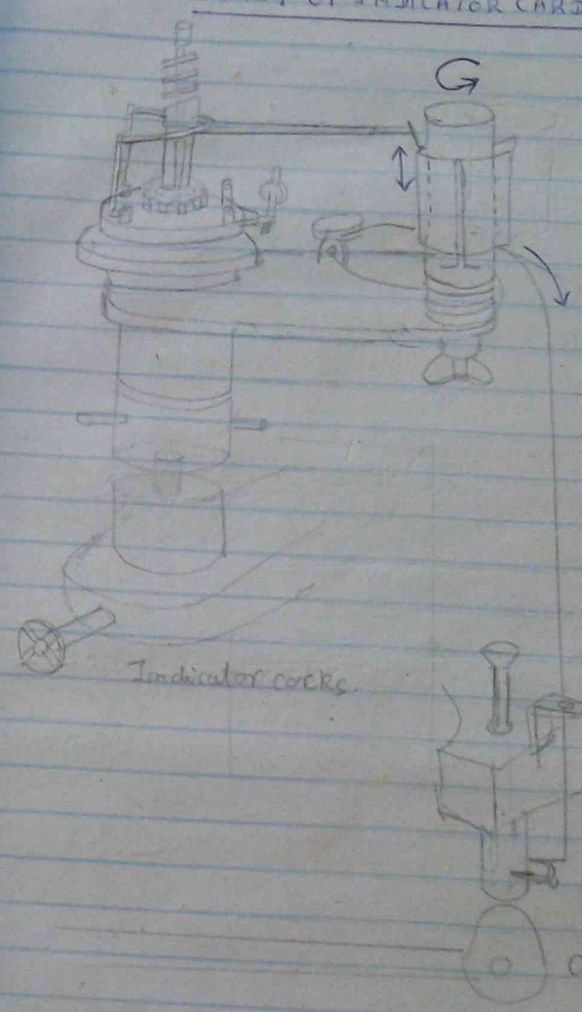
△ caused by valves leaking (or) incorrect by set leaking cylinder head gasket (or) injector sealing. (or) Excessive piston ring and cylinder bore wear.

‡ caused by water in fuel supply, blocked fuel Tank vapour faulty injector (or) pump (or) incorrect timing.

± caused by lack of ventilation, too much load, dirty Engine, overheating

17-3-87

STUDY OF INDICATOR CARD



cylinder ன் power ஐ அறிந்து கொள்ள.

(1) முதலில் Indicator cock ஐ திறந்து விட்டு pointer ஐ zero mark ல் நிறுத்தி பின் spring balance ஐ scale ல் 60 lbs ல் வைக்க

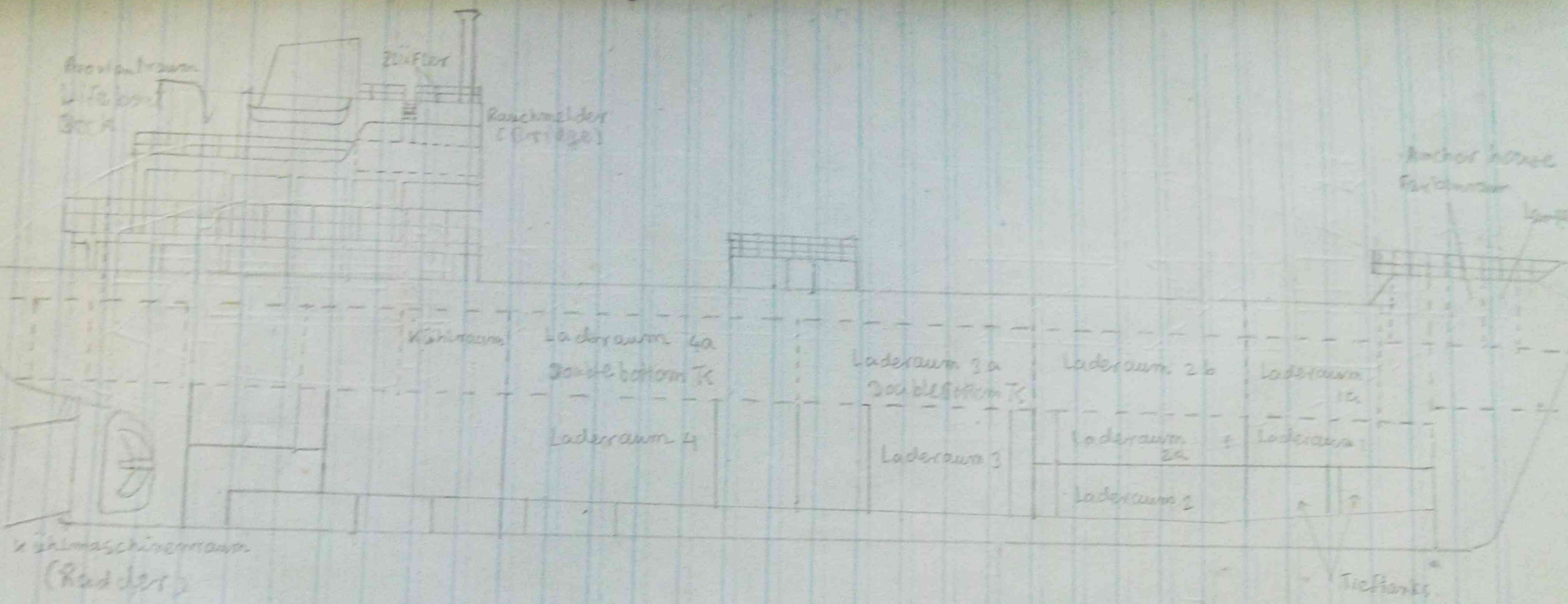
(2) power ஐ அறிய camshaft Indicator ஐ பொருத்தி vertical ல் horizontal motion ஐ கொடுத்து pointer ன் முனை diagram ஐ வரைக.

(3) ன் meter ல் காணும் power என்ன power ஐ குறிக்கும்

(2 months' ઉપરાંત ના કોર્સ: ૬૦૦ ગુણ)

(1) General Layout of vessel
(3) fire fighting equipment, their usage, location
(12) steering gear operation, testing
(13) machinery alarm system
(14) main switch board layout various switch and operation
(15) Deck machineries on board, type, layout and operation.
(16) Life boat engine, emergency fire pump & emergency engines
(17) main and Auxiliary engine operation

T6/5/87

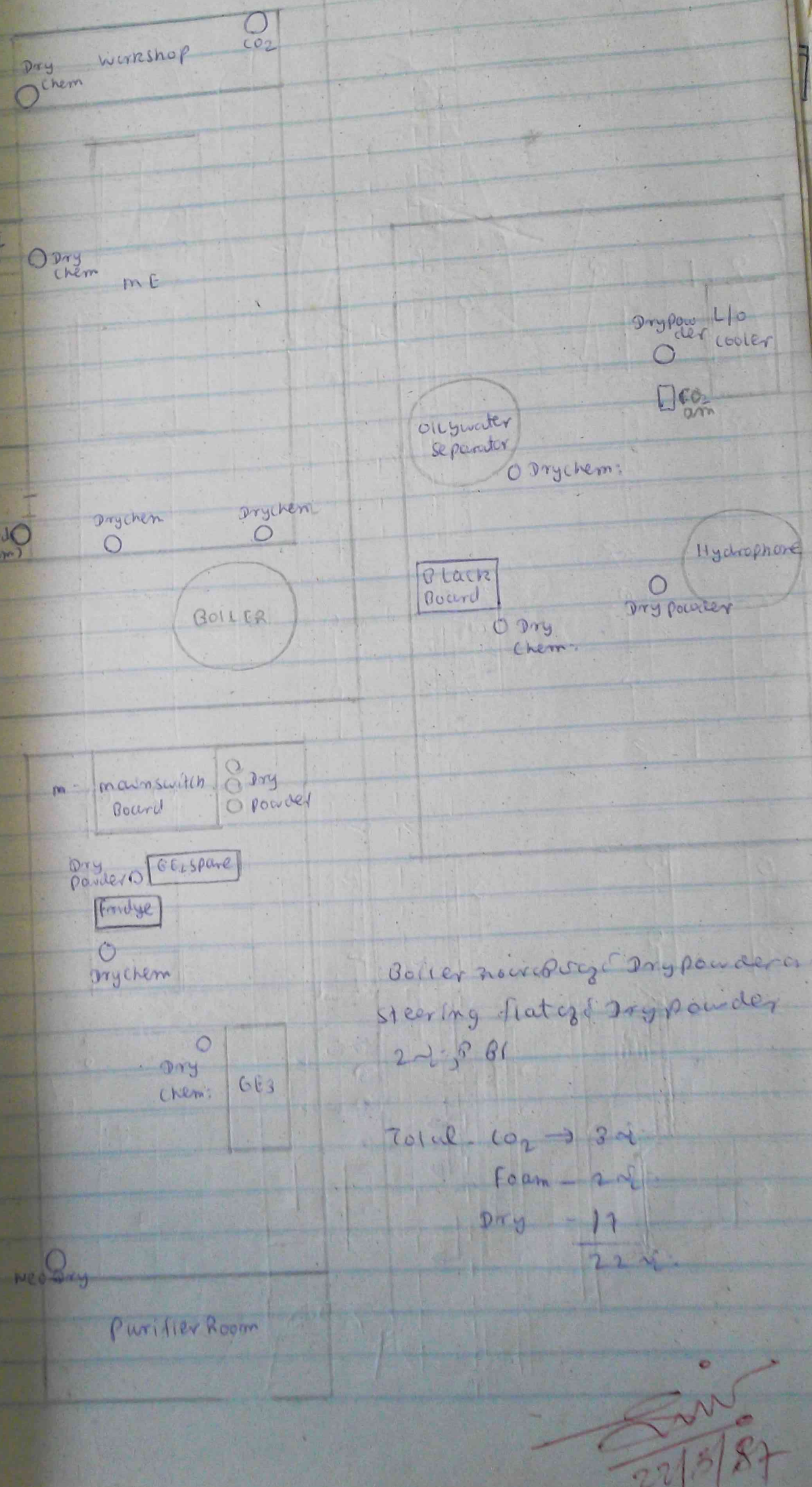


General Layout of vessel

(without cargo derricks)

16/3/87

Fire Fighting Equipments

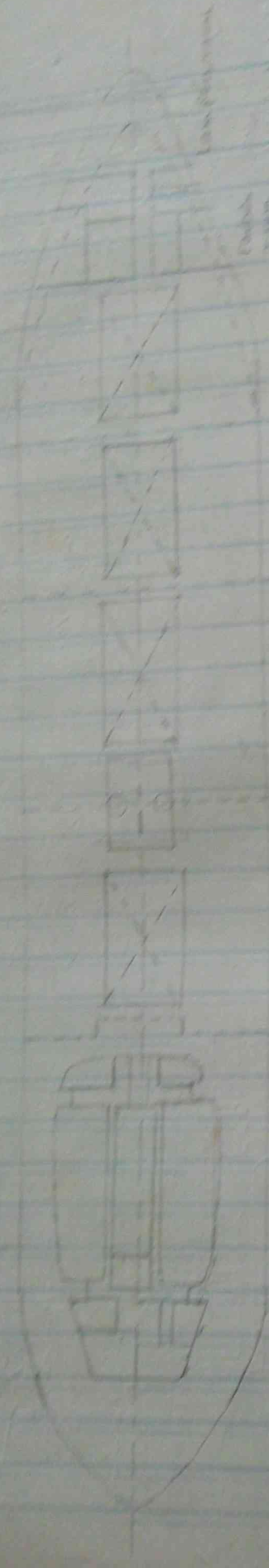


Boiler room Dry powder 2 nos
steering flat Dry Powder 2 nos
2 nos BA

Total CO_2 → 3 nos
Foam – 2 nos
Dry – 17
22 nos.

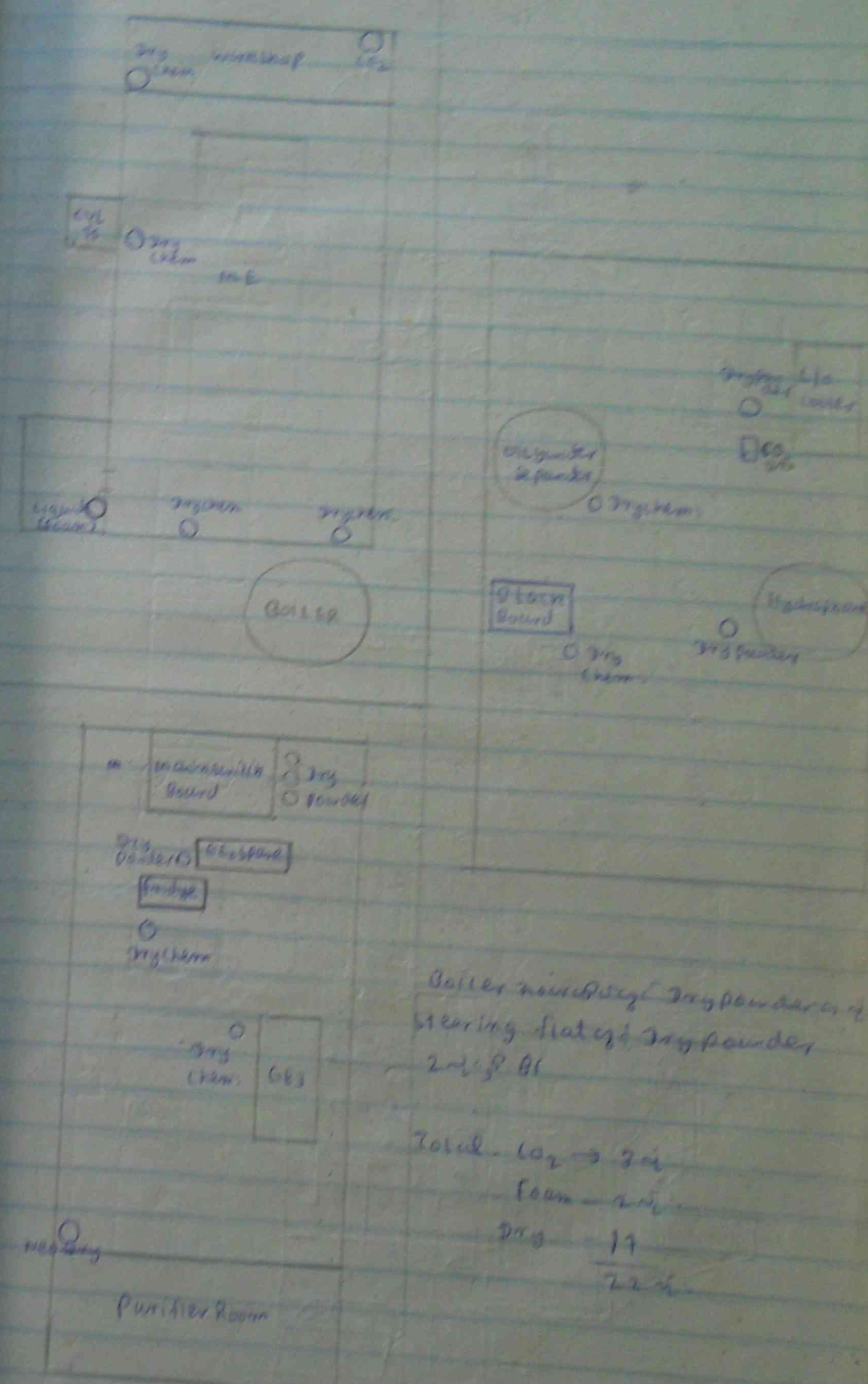
22/3/87

General Layout Of vessel



General Layout Of Vessel

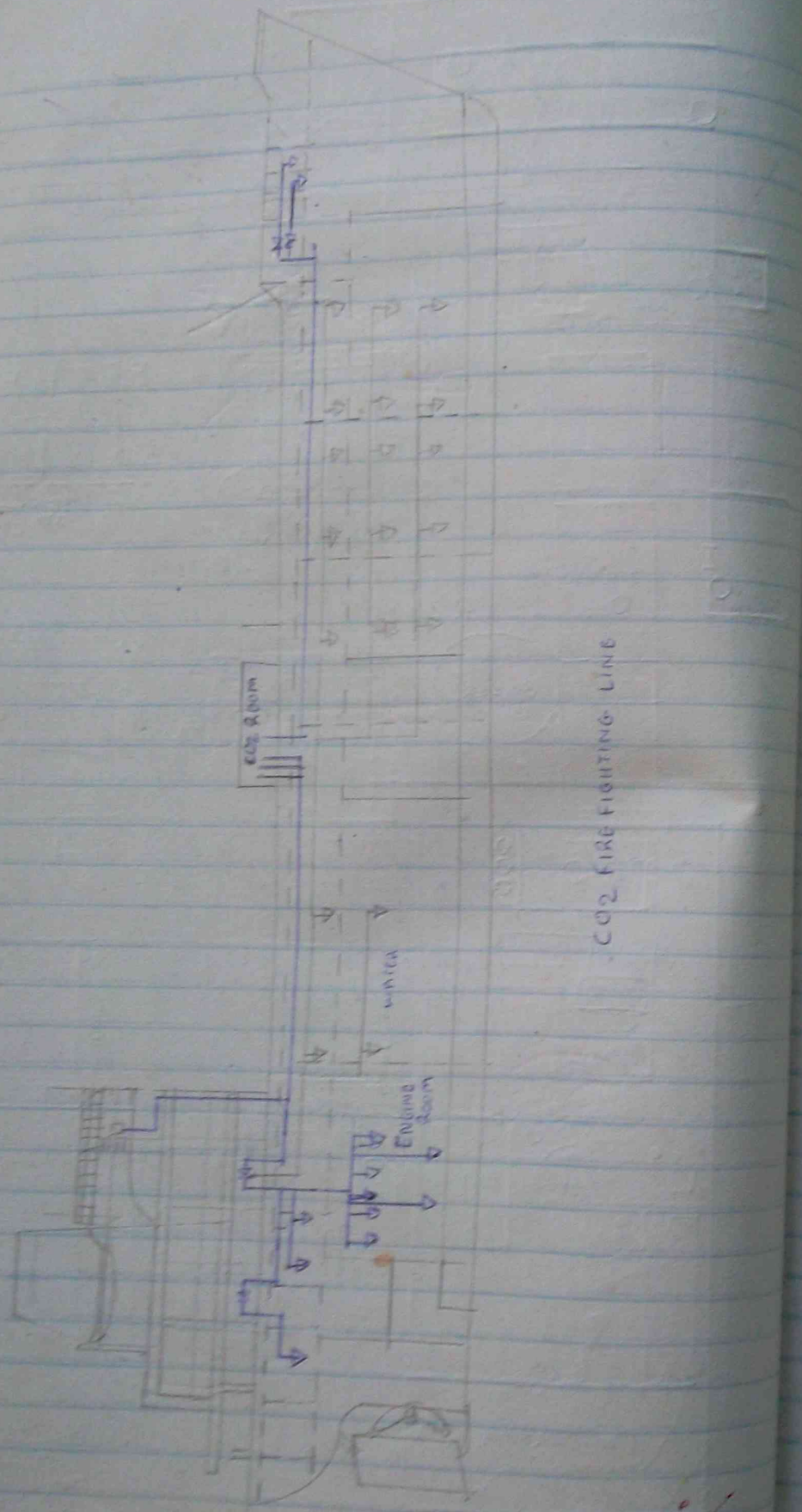
Fire Fighting Equipments

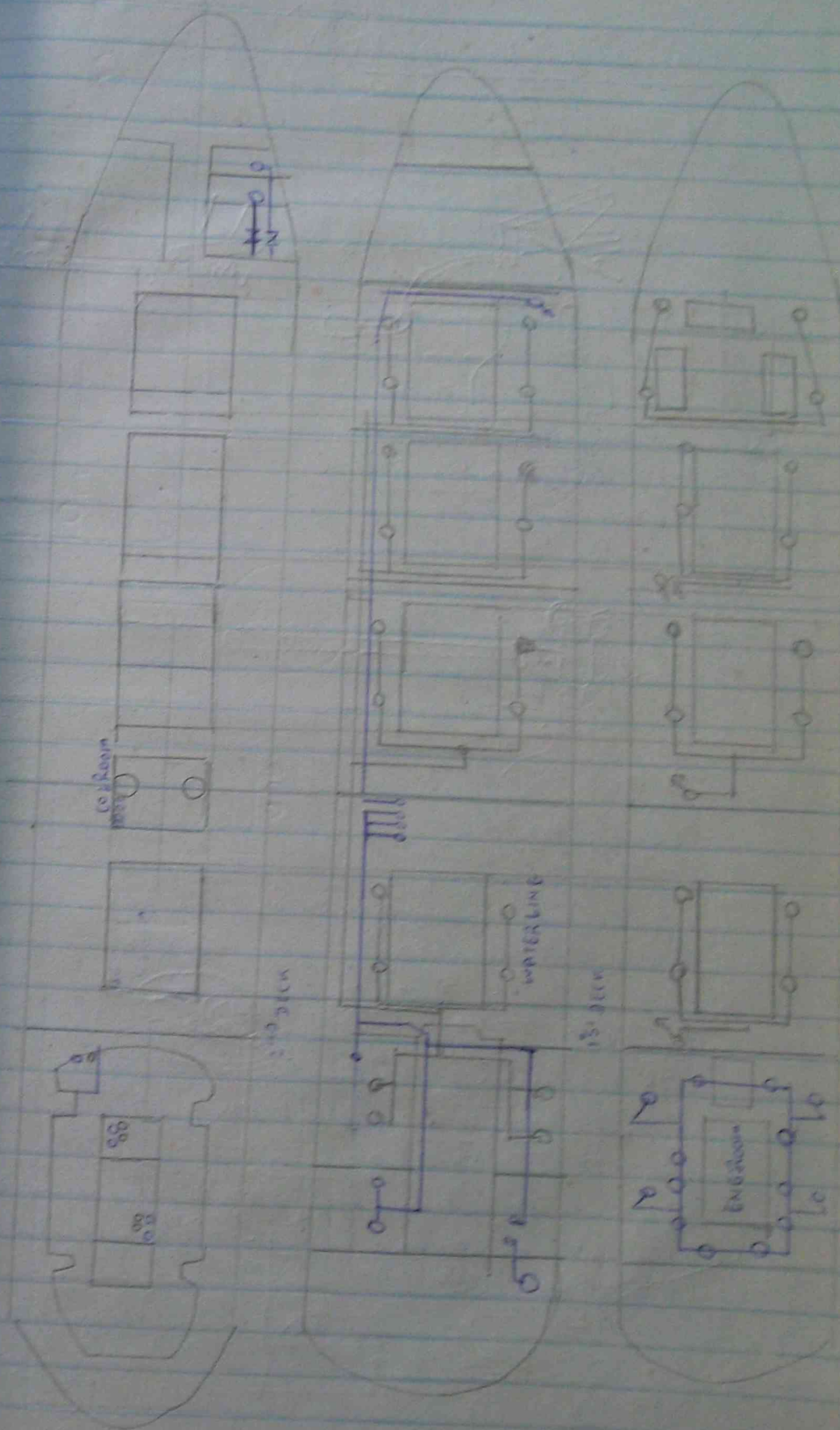


Boiler room Dry/ Dry powder
Steering flat Dry powder
2 ...

Total $CO_2 \rightarrow 7$
Foam – 2
Dry 11
22

CO2 FIRE FIGHTING LINE





Usage of fire fighting apparatus

(Dry chemical)

Directing Hose at fire
Pull safety pin
Grasp operate lever.

(CO_2)

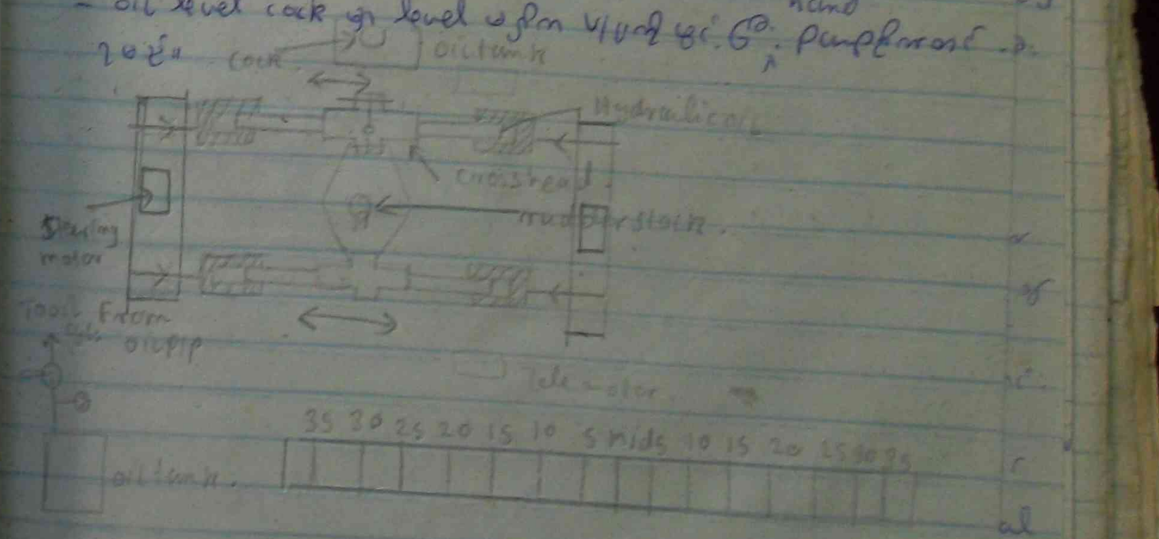
Remove safety pin
Get close to fire
open CO_2 valve, squeeze Grip
Discharge at seat of fire

(Foam)
Lift lever until lock open.
Turn extinguisher upside down.
wait for jet to build
Direct foam to fall lightly on blazing liquid when surface is below brim of receptacle aiming at factional side.

22/3/87

Steering control testing 20-3-87

- engineer ന്റെ നിർദ്ദേശപ്രകാരം 12 മണിക്ക് steering control test ചെയ്തു
- test ചെയ്യുന്നതിനുവേണ്ടി engine room ലുള്ള main switch board ഓൺ ചെയ്തു
- Bridge ലെ wheel തിരിക്കുമ്പോൾ engine room ലുള്ള rudder angle ന്റെ steering flat ലുള്ള Rudderstock ന്റെ crosshead ന്റെ മുകളിലുള്ള pin (starboard ന്റെ side ലുള്ള 35, port ന്റെ side ലുള്ള 35) വരെ ചലിക്കുന്നതായി engine room ലുള്ള rudder angle dial ൽ കാണുന്നുണ്ട്.
- (steering dial ന്റെ connection disconnect ചെയ്തതിനുശേഷം steering indicator lamp ഓൺ ചെയ്തു. dial ന്റെ connection തിരിച്ചിടുന്നു)
- Bridge ലുള്ള wheel തിരിക്കുമ്പോൾ rudder തിരിയുന്നതിനുള്ള test result കണ്ടു
- തുടർന്ന് steering motor ഓൺ ചെയ്തു (checking ചെയ്യുന്നതിനുവേണ്ടി) motor ഓൺ ചെയ്തു pumping ചെയ്യുമ്പോൾ oil level ൽ വരുന്ന വ്യത്യാസം നോക്കുന്നു.
- oil tank ലെ oil level ന്റെ അളവ് പരിശോധിക്കുന്നു
- steering motor ലേക്കുള്ള terminal, starter box ൽ പരിശോധിക്കുന്നു
- oil level cock ന്റെ level ചെക്ക് ചെയ്യുന്നു. hand pump ഓൺ ചെയ്തു



- steering motor ലുള്ള Air megger test result നോക്കുന്നു

22/3/87

ALarm System

Engine Room ဖို့ ALarm များ -

(1) Alarm Board
(2) G/E alarm
(3) Telephone Bell alarm
(4) Engineer panic alarm
(5) CO_2 Fire alarm.
(6) Telegraph alarm
စသည်ဖြင့်ရှိသည်။

(1) alarm board.

ဒီ board မော်နီတာလုပ်ရမည့်အချက်များ -

1. m/E samp
2. m/E F.W p/p
3. m/E L/O p/p
4. PTN Cooling
5. G/E, L/O p/p
6. G/E, F/W Temp
7. G/E$_2$ L/O Temp
8. G/E$_2$ F/W Temp
9. G/E3 L/O p/p
10. G/E3 F/W Temp
11. Electrical
12. F/O over flow Tk
13. D/O High Tk
14. T/O L/O p/p
15. unseen power
16. Boiler
17. m/E sump
18. Har S/W p/p
19. Har F/W p/p

ဒီ့အတွက်တွင်

(i) p/p များတွင်ဖြစ်ပေါ်လာနိုင်သော alarm
(ii) Temp: တက်လာခြင်းမှ ကာကွယ်သော alarm
(iii) ဆီ/ရေ စိုစွတ်ခြင်း, စက် ပိတ်သွားခြင်း
စိုးရိမ်သော alarm များကို ဖြစ်သည်။

(i) p/p ကို စတင်လည်ပတ်သော motor မှ.ckt: တွင် ချိတ်ဆက်ပြီး m: alarm board ကို မော်နီတာလုပ်ရန် motor မှ. ပြဿနာ များစွာတွင် ၃ မျိုးသော alarm တွင် တွေ့ရသောကြောင့် ဒီအတိုင်း ထားရှိခြင်း ဖြစ်သည်။

(ii) Temp: တိုးလာခြင်း Thermistor, Thermostat တို့သော sensing unit များကို အသုံးပြုပြီး ပုံမှန်ထက် ၂၄ ဒီဂရီ ကော်ကြာသော Thermostat ပိတ်သွားလျှင် ဒီ့ alarm ckt: တွင်တွေ့ရသော ပြဿနာများကို ဖြေရှင်းခြင်း ဖြစ်သည်။

(iii) ဆီ/ရေ စိုစွတ်ခြင်း ဖြစ်ပေါ်ခြင်းတွင် float switch များတွင် electrical ပိတ်သွားကို alarm ckt: ကတွေ့ရသော ပြဿနာများကို ဖြေရှင်းခြင်း ဖြစ်သည်။

22/3/87

Alarm & Indicator & alarm Bell connection

Alarm ... device ... alarm board ... Indicator ... Bell ... circuit ... Indicator ... sound ... alarm ... Indicator reset ... alarm ... supply ...

Generator Engine alarm

Luboil Pressure ⊗ | cool water Temp ⊗ | source ⊗ | Turbo oil Pr: ⊗ | overspeed ⊗

Engine L/O Pr: | cooling water temp | Turbo oil pressure | overspeed

Alarm & stop

ON ○ OFF — Bell stop ○ alarm stop

ഉദാഹരണം

G/E 3 Bell stop — alarm

G/E 1 Bell stop — alarm & stop

- G/E 1 Bell ... line ... alarm & stop ... common ... indicator
- ... alarm ... Bell stop ... common ... Bell ...

(G/E 3 ... G/E 1 ...)

Engineer Panic alarm switch ... Telegraph ... CO2 alarm ... line ... alarm ...

~~Main Switch Board Layout Various Switches & Operation~~

Main Switch Board Layout Various Switches & Operation

A — TFM R, TFM S, TFM T — ST gear 2, ST gear 1 — windlass — com press or — M/E LP P/P 1 & 2 — A

A — Boiler — Hor F/W P/P, Hor S/W P/P — Boiler P/P — Hor Res P/P — A

Bilge P/P — E/S P/P — H/O P/P — M/E F/W P/P — M/E S/W P/P — A

E/R Light Auto Group (1)

Transformer — Plug Eng Room — Plug upper deck — Plug lower deck

Sal. log — Gyro compass — Radio — Radar unit — Navigation light

Lighting 1st deck — Lighting 2nd deck — Lighting Boat deck — Auto group 1

Bridge Dist time — Lighting Fore deck — Domes: Petrol — Auto group 2

Windlass — H/O P/P 1 — H/O P/P 2 — M/E Emergency blower.

E/R-Light Auto group (2)

Life Boat winch — Radar — D/O Auto P/P — D/O Transit cond — Boiler

D/O P/P — Hydy P/P — Booster P/P — Nozzle 1 — Nozzle 2

T/O P/P — T/O H/O P/P — Pes: Hor: Fwd P/P — Hor Sw Aft P/P — Hor F/W Gear P/P — Ejector P/P

Steering Gear 1 — 2 — Boiler

M/E F/W cool P/P — H/O P/P — E/S P/P — Bilge P/P — Capstan

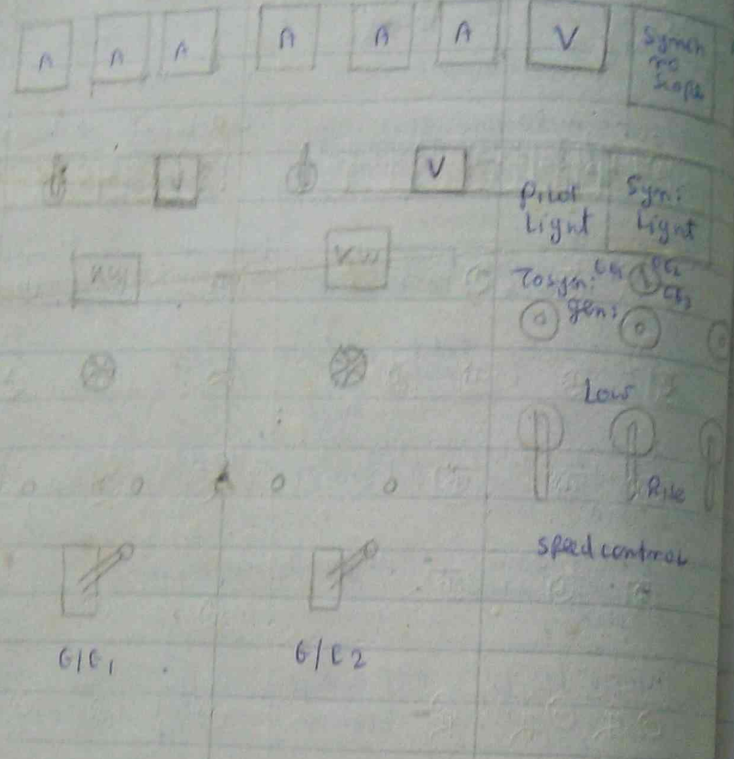
M/E S/W cool P/P — M/E std by cool P/P — A/C compr.

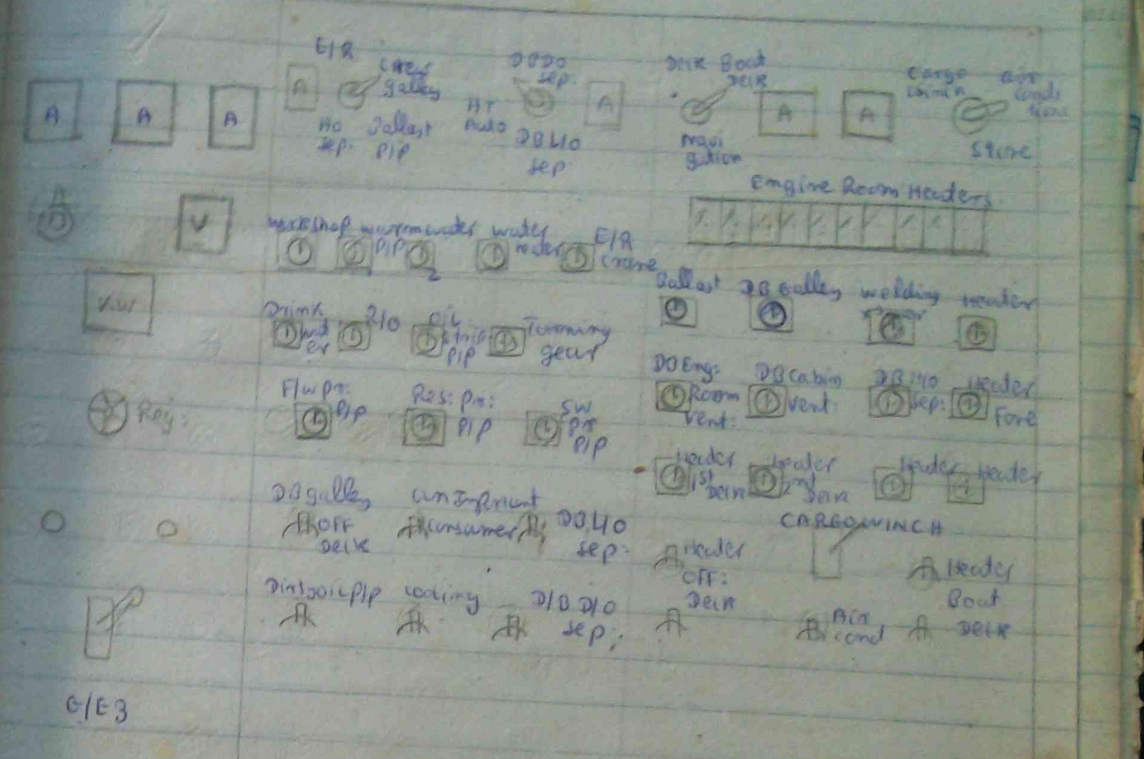
- selector switch

... meter ... current, voltage ... control all ... switch position ... power ... operate ...

- Synchroscope — ... speed, freq, voltage ... generator ... generator ... speed ... fast, slow ... synchroscope ... speed ... synchronizing

- Synchronizing lamp — all dark method ... gen ... freq ... opposite ... resultant ... synchronizing



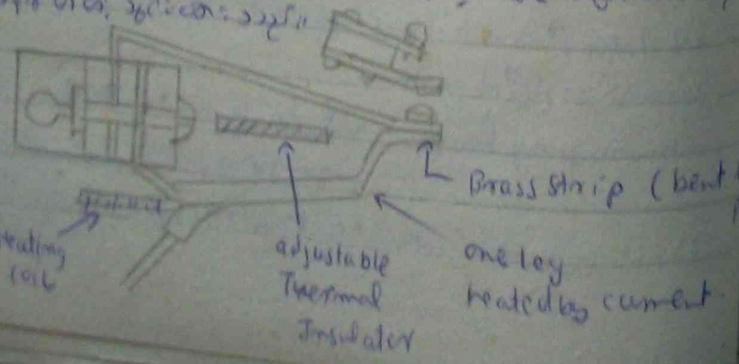


ഗ്രൂപ്പ് ഇൻഡക്ഷൻ റഗുലേറ്റർ

voltage regulator

AC generator ന്റെ field ൽ DC കറന്റ് കടത്തിവിടുമ്പോൾ ഉണ്ടാകുന്ന voltage developed ആണ് exciter ന്റെ voltage output ന്റെ ഏറ്റക്കുറച്ചിൽ അനുസരിച്ച് generator ന്റെ voltage ൽ വ്യത്യാസം വരുന്നു. ഈ voltage നിയന്ത്രിച്ച് ഒരു constant DC voltage ൽ regulate ചെയ്യുന്നു.

ഓവർകറന്റ് റിലേ: uni metallic Thermal relay switch ആണ് ഓവർലോഡ് protection നായി fuse ഉപയോഗിക്കുന്നു. ഇതിന്റെ ഗുണദോഷങ്ങൾ:



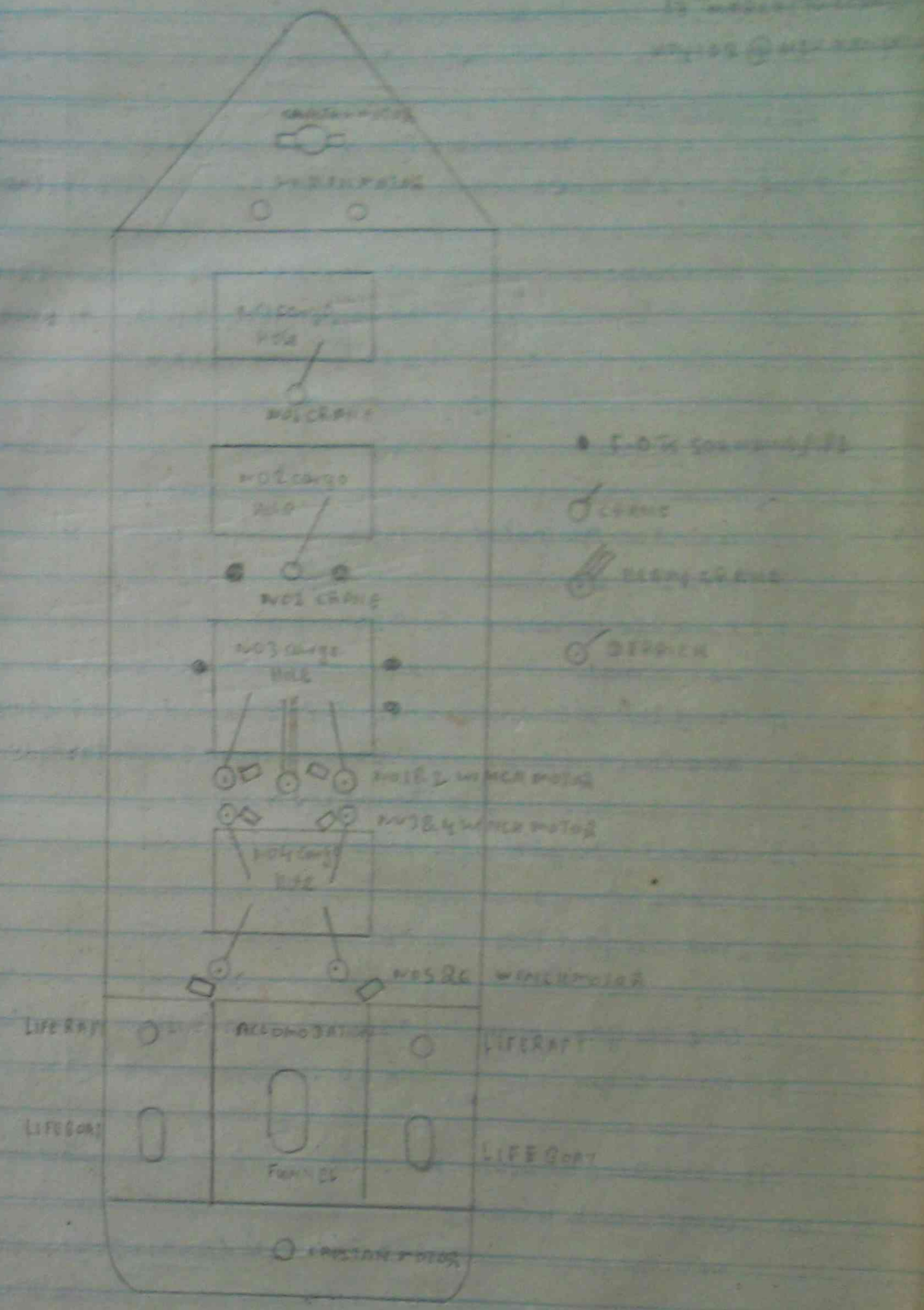
ഓയിൽ ലെവൽ ഇൻഡിക്കേറ്റർ: ഓയിൽ ലെവൽ കുറയുമ്പോൾ ഫ്ലോട്ട് താഴുകയും അതിനോടൊപ്പം ഘടിപ്പിച്ചിരിക്കുന്ന Hair pin ഉം താഴുകയും അതിനനുസരിച്ച് ഓയിൽ ലെവൽ കാണിക്കുന്നു. ~~Fresh Heater coil~~ ഓയിൽ ലെവൽ കുറയുമ്പോൾ ഓയിൽ ഫ്ലോട്ടിനോടൊപ്പം താഴുകയും അതിനനുസരിച്ച് ഓയിൽ ലെവൽ കാണിക്കുന്നു. ഫ്ലോട്ട് ഒരു നിശ്ചിത ലെവലിൽ താഴുമ്പോൾ ഓയിൽ ലെവൽ കുറയുന്നു.

ഉപയോഗങ്ങൾ:

- Pressure switch, Thermostat switch തുടങ്ങിയവയിൽ ഉപയോഗിക്കുന്നു. Thermostat ന്റെ gen: ഉം purifier ഉം: Pressure switch ന്റെ Hydrophone ഉം ഉദാഹരണങ്ങൾ.

22/3/21

(DECK machineries, On Board)



SHIP LAYOUT DIAGRAM (MACHINERIES ON BOARD)

(DECK machineries on board).

(Layout)

Deck Machineries on Board, Type Layout & Operation

(A) USI TYPE

(Cargo Winch & Windlass system.)

ITEM	NAME OF MACHINERY	PARTICULAR	TYPE OF BEARING
1	Converter AC motor NO1 (m_1)	AEG, TYP A21-11/2 3 mot, NO 1016971 Δ 380V, 66A, 45 NP cosφ :0·86, 2840V/min 50 Hz INSUL : KB 30 MIN	SKF 6312 BOTH SIDE
2	converter AC motor NO 2 (m_1)	AEG	
3	converter AC motor NO3 (m_1)	AEG	
4	converter DC Generator NO1 (m_2)	AEG Typ G 28 mod G-Gen Nr 682428 ±220V, 104 A	SKF 6308 Both Side
5	converter DC gen: NO2 (m_2)	AEG	
6	Cont DC gen: NO3 (m_2)	AEG	〃
7	cont DC gen: NO4 (m_2)	AEG	〃
8	cont DC gen: NO5 (m_2)	AEG	〃
9	cont DC Gen NO6 (m_2)	AEG	〃
10	cargo winch motor NO1 (m_3)	AEG Typ, TLW 35/24 a1 G NO1 NR 220V, 98A, 18·4 kW 550/2240U/min, 25 hp PS	Driven Side Roller bearing NU 312 Antidriver Side Ball Bearing SKF 6312
	Brake (S_1)	Brake Typ mbyf 56, 110V 2·65A, clearance 0·6 → 1·0 mm	

ITEM	NAME OF MACHINERY	PARTICULAR	TYPE OF BEARING
11	cargo winch motor NO2 (m_3)	AEG	〃
12	cargo winch motor NO3 (m_3)	AEG	〃
13	Cargo winch motor NO4 (m_3)	AEG	〃
14	cargowinch motor NO5 (m_4)	AEG	〃
15	cargowinch motor NO6 (m_5)	AEG	〃

16 Derrick Topping winches Type EHa W-F 1,5/12

ITEM	NAME OF MACHINERY	PARTICULAR	TYPE OF BEARING
16	Derrick Topping winch NO1 (m_1) motor	AEG, AG112 S473 Rau form V_1, 4·0 PS KB 10 MIN, 1400U/min 380V, 50 Hz	〃
	Brake (S_1)	Typ 41314, 14E schutzart P33, 75W 110V.	〃
17	Derrick Topping winch NO2 (m_1) motor	AEG	〃
18	Derrick Toppingwinch NO3 (m_1) motor	AEG	〃
19	Derrick Topping winch NO4 (m_1) motor	AEG	〃
20	Derrick Topping winch NO5 (m_1) motor	AEG	〃
21	Derrick Topping winch NO6 (m_1) motor	AEG	〃

ITEM	NAME OF MACHINERY	PARTICULARS	TYPE OF BEARING
22	ward Leonard converter set of Runner (combine unit)	DC generator AEG TYP G 265 mod, 2×9.5 KW, DAB 20%, ED P3, P22, 2×220V AC motor AEG, TYP A×4043 22.5 KW, DAB 15%, ED P44 380V 3φ 50 HZ	SKF 6309 SKF 7309 B
23	Runner motor	AEG TYP, TLW 35/24, 25PS 18.4 KW, AB 20%, ED P10B P44, 220V, GS Brake mbgf 5.5, 110V Clearance .6 → 1 mm	NU 312 6312
24	DC generater of Jib motor	AEG TYP G 245, 8.5 KW DAB 20%. ED, V, P22, 230V 2860 U/min	SUPG 306 SKF 6206
25	AC motor of Jib converter	AEG TYP A 15, 21/2 11 KW, DAB 20% ED V3, P22, 380V, 3φ 50 HZ 2860 U/min	SKF 6307 SKF 6301
24	DC motor of Jib Topping	AEG TYP GU 257 7 KW, AB 20%. ED, V 1/B 5B; P44 S. 220V, 65, 1450 U/min. Brake mbgf, 13, 110V	SKF 6306 gearside SKF 6206 Cfreeend

CENTER FIXED CRANE

ITEM	NAME OF MACHINERY	PARTICULARS	TYPE OF BEARING
25	DC generator of Turning motor	AEG, TYP G245 mod, 8.5 KW DAB 20%, ED, V1, P22, 230V 2860 U/min	SKF 6303 SKF 6206
26	AB motor of turning converter	AEG, TYP A15, 21/2 11 KW DAB 20%. ED, V3, P22, 380V 50 HZ 2860 U/min	SKF 6307

ITEM	NAME OF MACHINERY	PARTICULARS	TYPE OF BEARING
36	WINDLASS MOTOR	AEG, TYP UMA 7 FB 2L 3/4 U2/U2. Dmot INR 1738404 ΔY 380V 70/40A, 20/15 KW 0.74/.85 cosφ. 740/1475 U/min, 50 HZ Brake mbgf 65	SKF 6320
37	Capstan motor	AEG, Schiftban, Hamburg NR 1736431 Type UV 8 → 4 Δ/Y 380V, 34/16.2 A cosφ 0.82/0.4 HB = 30 P22 RPM 725/1405 50 HZ, 22/11 P-S 15/30 KW Brake mbgf 45	
38	Steering motor	Simon, Schuckert Type R 673-6, P3, P21 NR 744570, Insul E, 50 HZ, 380V Δ, 26A, 12 KW, cosφ=.83	
39	Bridge wind screen Clear view motor STB	Typ G 115 220V, 1φ, 50 HZ 0.4 KW, 1400 rpm	
40	Smoke Detector Extractor Blower NO 1 & 2.	Dmot Typ MEC 20/5 220/380V; 1.7/.0A 0.37 KW, cosφ 0.9, 2850 U/min, 50 HZ	

(8) OPERATION

Cargo winch up: ചരക്ക് കയറ്റൽ

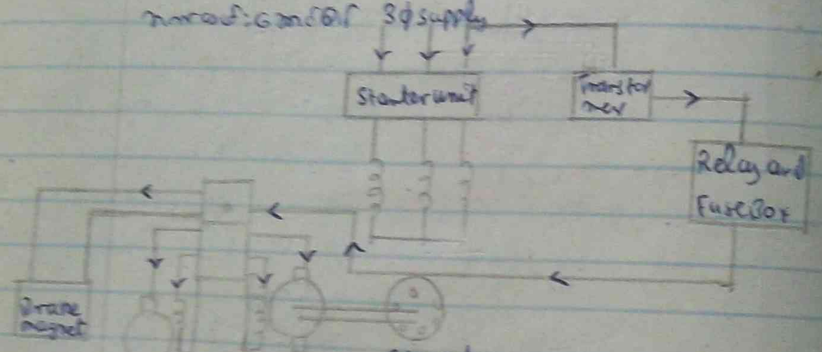
Main switch board ന് cargo winch power switch up gen: power ന്റെ winch up: ന് വേണ്ടുന്നതുമായ motor generator set up: ന്റെ ക്രമീകരണം

No 1 & 2, 3 & 4, 5 & 6 എന്നീ motor generator set കൾ ഉപയോഗിച്ച്.

No 1 & 2, 3 & 4 എന്നീ Heavy derrick mast house ൽ ഓരോന്നിൽ

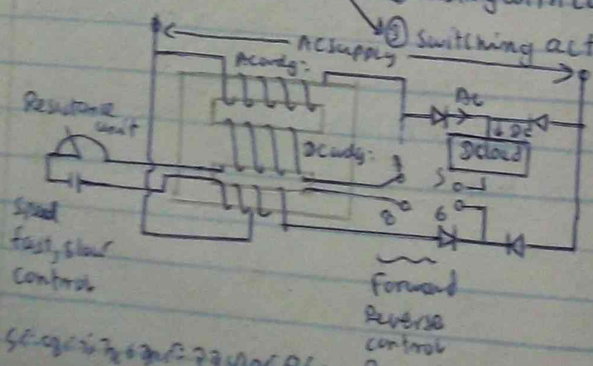
No 5 & 6 എന്ന Engine room 3rd Platform ൽ ഓരോന്ന്: ക്രമീകരിച്ചിരിക്കുന്നു. winch ന്റെ converter ന്റെ ക്രമീകരണം

ഓരോ Transconductor controller ലും ഓരോ Brake പ്രവർത്തിക്കുന്നു. (ഓരോ ദിശയിലുള്ള Brake കൾക്കും ഓരോന്നുവീതം) 1 forward reverse എന്നിവയിൽ 1 ന്റെ ഗുണിതങ്ങൾ Transductor ഉപയോഗിക്കുന്നു. ഇവയുടെ ക്രമീകരണം ഓരോ master controller നും ഉണ്ട്. ആവശ്യത്തിന് 3φ supply



Transductor പ്രവർത്തനം

① Magnetic Amplifier
② using with Load
③ Switching action.

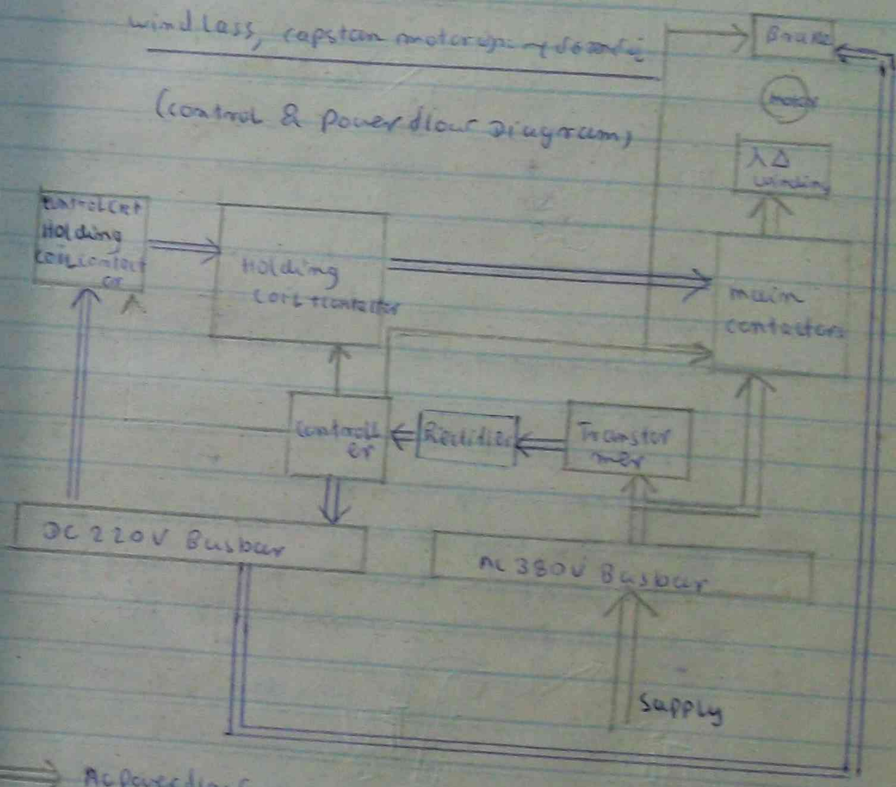


ഇവയിൽ നിന്നുള്ള വ്യത്യാസം control winding ലേയ്ക്ക് signal (wdg:) DC വ്യത്യാസപ്പെടുത്തുന്നു. ഇതിനായി ഓരോ Acwdg: ന്റെയും master controller ലുണ്ടാകുന്ന control voltage ലിൽ

[signature] 27/3/87

wind lass, capstan motor up: ന്റെ പ്രവർത്തനം

(control & power flow diagram)



AC power flow
DC control signal flow
contact open & close manual control

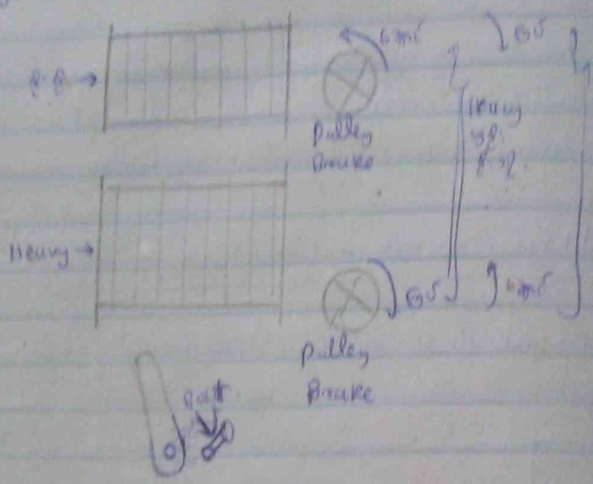
[signature] 27/3/87

Supply യുടെ AC ആയതിനാൽ motor ന്റെ ഏതു ഘട്ടത്തിലും ഓരോ contact ഉം ഓരോ ദിശയിലുള്ള ചലനത്തിനും ഓരോന്നുവീതം ഉപയോഗിക്കുന്നു. ഇവയുടെ ക്രമീകരണം ഓരോ DC Busbury controller ന്റെ ഉള്ളിൽ ചെയ്യുന്നു. ഇവയുടെ നിയന്ത്രണം ചെയ്യുന്നത് Holding coil contactor ആണ്. ഇത് normal ആയി ഓഫ് ചെയ്തിരിക്കുന്നു. ഓരോ contactor ഉം ഓരോ master controller ന്റെ നിയന്ത്രണത്തിലാണ്. master controller main contact (Holding coil ന്റെ) ഓണാകുമ്പോൾ Holding coil ന് AC ആയതിനാൽ main contact up: ചെയ്യുന്നു. motor ന്റെ ഏതുഘട്ടം

Heavy cargo Gear ಬಗ್ಗೆ ತಿಳಿ.

(Heavy derrick SWL 60T)

center ಮಾಸ್ಟ್ ಮೇಲೆ ಒಂದು cargo ಬೂಮ್ ಮತ್ತು ಪಿಲ್ಲರ್ ಮೇಲೆ heavy ಬೂಮ್ ಇರುವ gear ಅನ್ನು heavy derrick gear ಎನ್ನುವರು. ಇದರಲ್ಲಿ cargo ಬೂಮ್ ಹಾಗೂ heavy ಬೂಮ್ ಇರುತ್ತವೆ.



(i) Brake ಅನ್ನು ಕೆಳಗೆ ಒತ್ತಿದಾಗ Heavy ಮತ್ತು brake ಹಾಗೂ pulley ಅನ್ನು ಬಿಡುಗಡೆ ಮಾಡಲಾಗುತ್ತದೆ.

(ii) ಕೆಳಗೆ ಇರುವ cargo gear ಅನ್ನು ಆಪರೇಟ್ ಮಾಡಲು ಸಹಾಯಕ ಇರುತ್ತಾನೆ.

ಈ ಸಹಾಯಕ

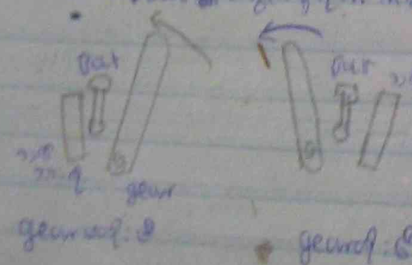
(a) ಬೂಮ್ ಅನ್ನು ಮೇಲೆ ಕೆಳಗೆ ಮಾಡುವನು

(b) Gat ಬಳಸಿ shutter ಅನ್ನು ತೆರೆಯುವನು

(c) gear ಅನ್ನು ಆಪರೇಟ್ ಮಾಡಲು motor ಅನ್ನು ಸ್ಟಾರ್ಟ್ ಮಾಡುವನು

(d) ಆಪರೇಟರ್ gear ಅನ್ನು ಆಪರೇಟ್ ಮಾಡಲು ಸಹಾಯ ಮಾಡುತ್ತಾನೆ.

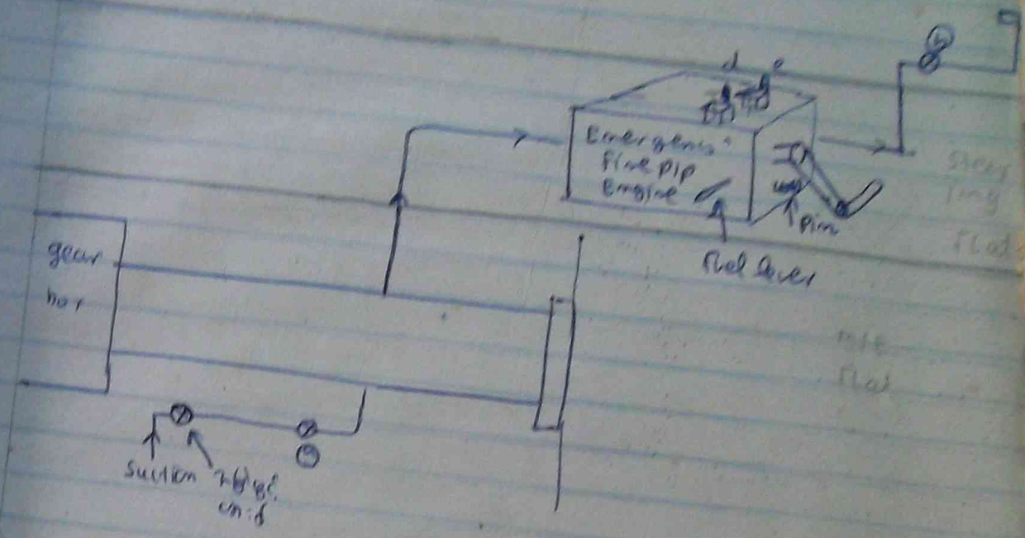
ಇವನು ಆಪರೇಟರ್ Gat ಅನ್ನು ಬಳಸಿ shutter ಅನ್ನು ತೆರೆಯುವನು.



Steam pump — ಇದು, Shutter.

16/3/87

Emergency fire pump ಬಗ್ಗೆ ತಿಳಿ.



① a, b, c ಕವಾಟಗಳು ಮುಚ್ಚಿರುತ್ತವೆ

② ಟ್ಯಾಂಕ್ level ಅನ್ನು ನೋಡಿಕೊಳ್ಳಬೇಕು

③ pin ಅನ್ನು ಎಳೆದಾಗ ಸ್ಪ್ರಿಂಗ್ ಸಹಾಯದಿಂದ ಪಿನ್ ಹೊರಗೆ ಬರುವಂತೆ ಮಾಡಲಾಗುತ್ತದೆ.

④ ಎಳೆದ ಪಿನ್ ಮತ್ತೆ ಸೇರಿಸಲು ಪಿನ್ ನಲ್ಲಿರುವ T pin ನ್ನು ಎಡಕ್ಕೆ ಅಥವಾ ಬಲಕ್ಕೆ ತಿರುಗಿಸಿದಾಗ ಸಣ್ಣ air inlet ಮುಚ್ಚಿಕೊಳ್ಳುತ್ತದೆ.

⑤ fuel lever ಅನ್ನು ಸಹಾಯಕ ಮೇಲೆ ಕೆಳಗೆ ಮಾಡುವನು

⑥ ಸ್ಟಾರ್ಟ್ ಮಾಡಲು ಬಳಸುವ ಸಿಲಿಂಡರ್ ಅನ್ನು ಹೊತ್ತಿಸಲು ಬೆಂಕಿ ಪೊಟ್ಟಣ

⑦ ಎಂಜಿನ್ ಬಿಸಿಯಾದ ನಂತರ fuel lever ಅನ್ನು ಕಡಿಮೆ ಮಾಡಲಾಗುತ್ತದೆ

⑧ ಫೈರ್ ಎಂಜಿನ್ ಅನ್ನು ಸ್ಟಾರ್ಟ್ ಮಾಡಲಾಗುತ್ತದೆ

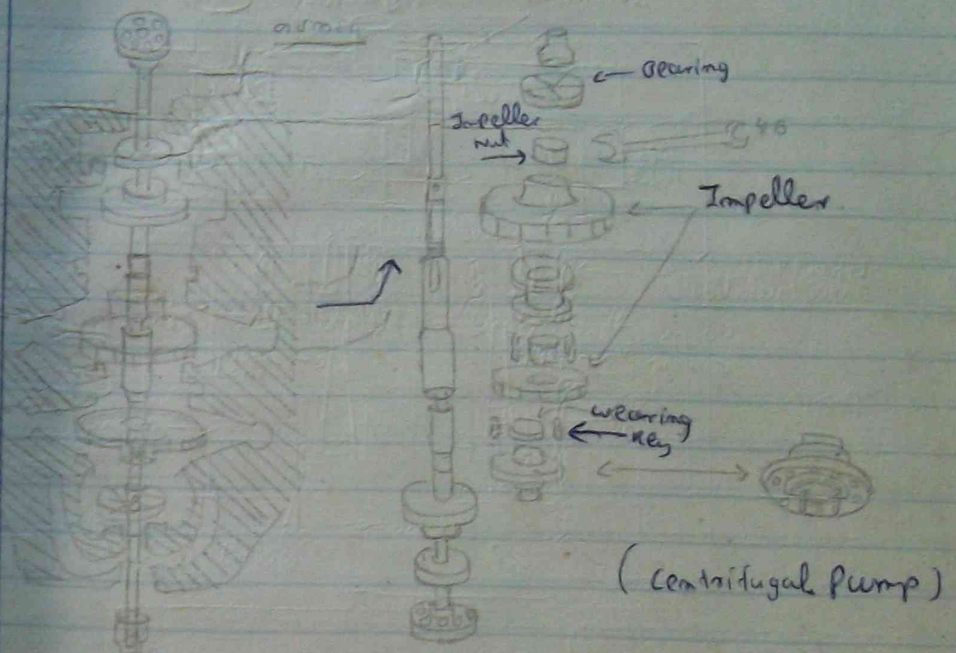
⑨ ಬೆಂಕಿ ಆರಿಸಲು fuel lever ಬಳಸಲಾಗುತ್ತದೆ

⑩ ಹೆಚ್ಚಿನ ಎಂಜಿನ್ ಗಳಲ್ಲಿ ಸಮುದ್ರದ ನೀರನ್ನು ಕೂಲಿಂಗ್ ಗಾಗಿ ಬಳಸಲಾಗುತ್ತದೆ.

16/3/87

VOY 102
MANGALORE
10-3-87

G/S pump ನಲ್ಲಿ ಮಾಡಬೇಕಾದ ಕೆಲಸಗಳು:



(Centrifugal Pump)

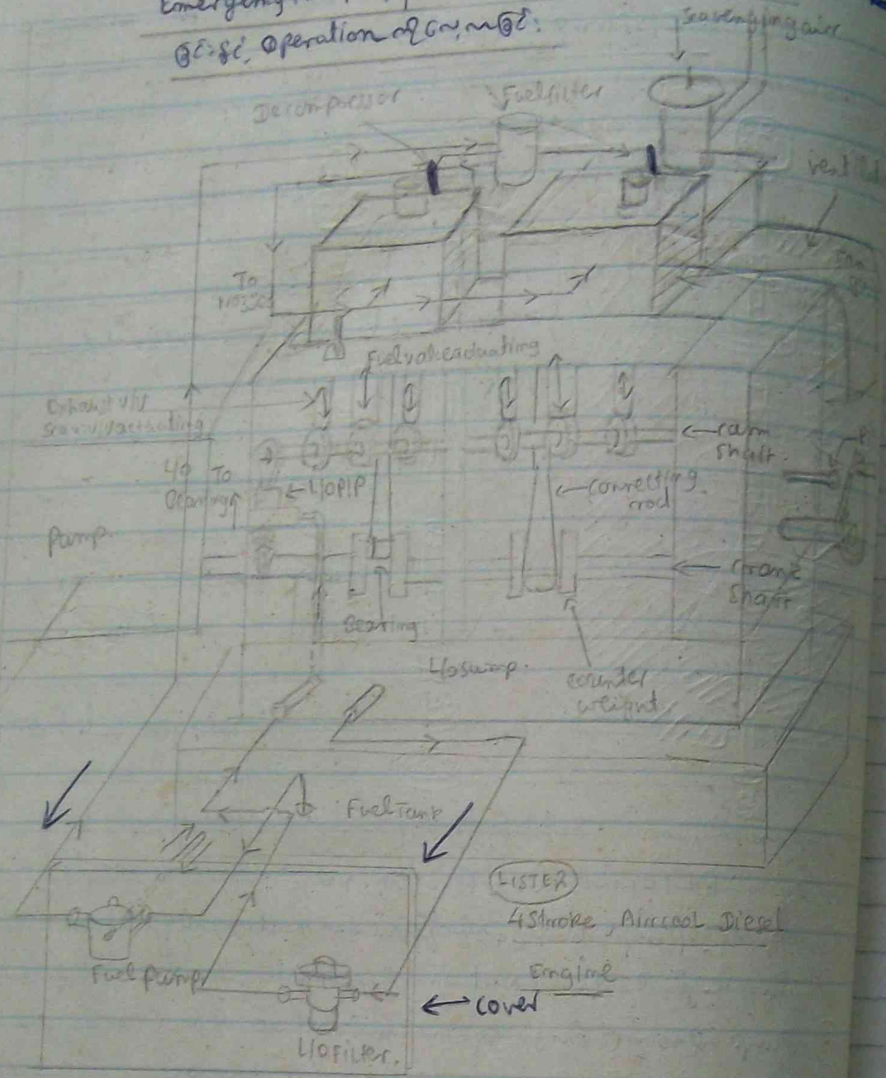
G/S pump ನಲ್ಲಿ ಮೋಟಾರು ಬದಲಿಸಲು ಕೆಲಸಗಳು:

1. motor ನ ಟರ್ಮಿನಲ್‌ನಲ್ಲಿ ಕೆಲಸ ಮಾಡಬೇಕು.
2. motor ನ್ನು Pump Body ಗೆ ಜೋಡಿಸಿರುವ ಬೋಲ್ಟ್ Nut ಗಳನ್ನು ಬಿಚ್ಚಬೇಕು.
3. Couple ನ Bolt and Nut ಗಳನ್ನು ಬಿಚ್ಚಬೇಕು.
4. Pump ನ ಮೇಲ್ಭಾಗದಲ್ಲಿ ನೆಲ ಹೊಂದಿಸಿರುವ ನಟ್ ಗಳನ್ನು ತೆಗೆಯಬೇಕು.
5. ಮೋಟಾರನ್ನು ಮೇಲಕ್ಕೆತ್ತಲು Chain block ನ್ನು ಹೊಂದಿಸಬೇಕು.
6. Pump ನ Impeller ಅನ್ನು ಮೇಲಕ್ಕೆತ್ತಲು ಮೋಟಾರಿನ ಮೇಲ್ಭಾಗದಲ್ಲಿ ಒಂದು ಬೋಲ್ಟ್ ಅಳವಡಿಸಿರಬೇಕು.
7. Couple ಸಹಿತ ಮೋಟಾರನ್ನು Chain block, Cargo sling ಸಹಾಯದಿಂದ ಮೇಲಕ್ಕೆತ್ತಬೇಕು.
8. Impeller shaft ನ್ನು ಪ್ರತ್ಯೇಕಿಸಬೇಕು.
9. motor over load ಆಗಲು ಈ Impeller Nut ನ್ನು ಸರಿಯಾಗಿ ಬಿಗಿದಿರಬೇಕು. ಇದರಿಂದ Impeller ನ್ನು PIP Body ಗೆ ಜೋಡಿಸಿರುವ ಬೋಲ್ಟ್ friction ಆಗಿ ಪ್ರತ್ಯೇಕಿಸಲು ಕಷ್ಟ, ಬೋಲ್ಟ್, Impeller Nut ಮುರಿಯುವ ಸಾಧ್ಯತೆ ಇರುತ್ತದೆ.
10. PIP ನಿಂದ ಪಂಪ್ ಮುಖ್ಯ Impeller ಅನ್ನು ಪ್ರತ್ಯೇಕಿಸಲು ಬೇರಿಂಗ್ ಹೌಸಿಂಗ್ ಮತ್ತು Body ಯ ಮಧ್ಯೆ ಇರುವ ಬೋಲ್ಟ್ ನಟ್‌ಗಳನ್ನು ಬಿಚ್ಚಬೇಕು. Bush Bearing ಆಗಿರುತ್ತದೆ.
11. Tight ಆಗಿರುವುದರಿಂದ ಅದನ್ನು ಸಡಿಲಗೊಳಿಸಲು:
    (i) ಬೋಲ್ಟ್: Body ಗೆ ಜೋಡಿಸಿರುವ Bolt and Nut ಗಳನ್ನು tight ಮಾಡಬೇಕು.
    (ii) Bearing ನ Nut ಗಳನ್ನು Tight ಮಾಡಬೇಕು.
    (iii) ಸಡಿಲವಾಗಿರುವ ಸಲುವಾಗಿ Nut ಗಳನ್ನು tight ಮಾಡಿ ಅನಂತರ ಬಿಚ್ಚಬೇಕು.
12. Testrun ಮಾಡಬೇಕು.

Engine

Emergency Fire Pump ကို crank cover ပြောင်းပြီး

မိုင်းစက် operation လုပ်ပုံများ



LISTER

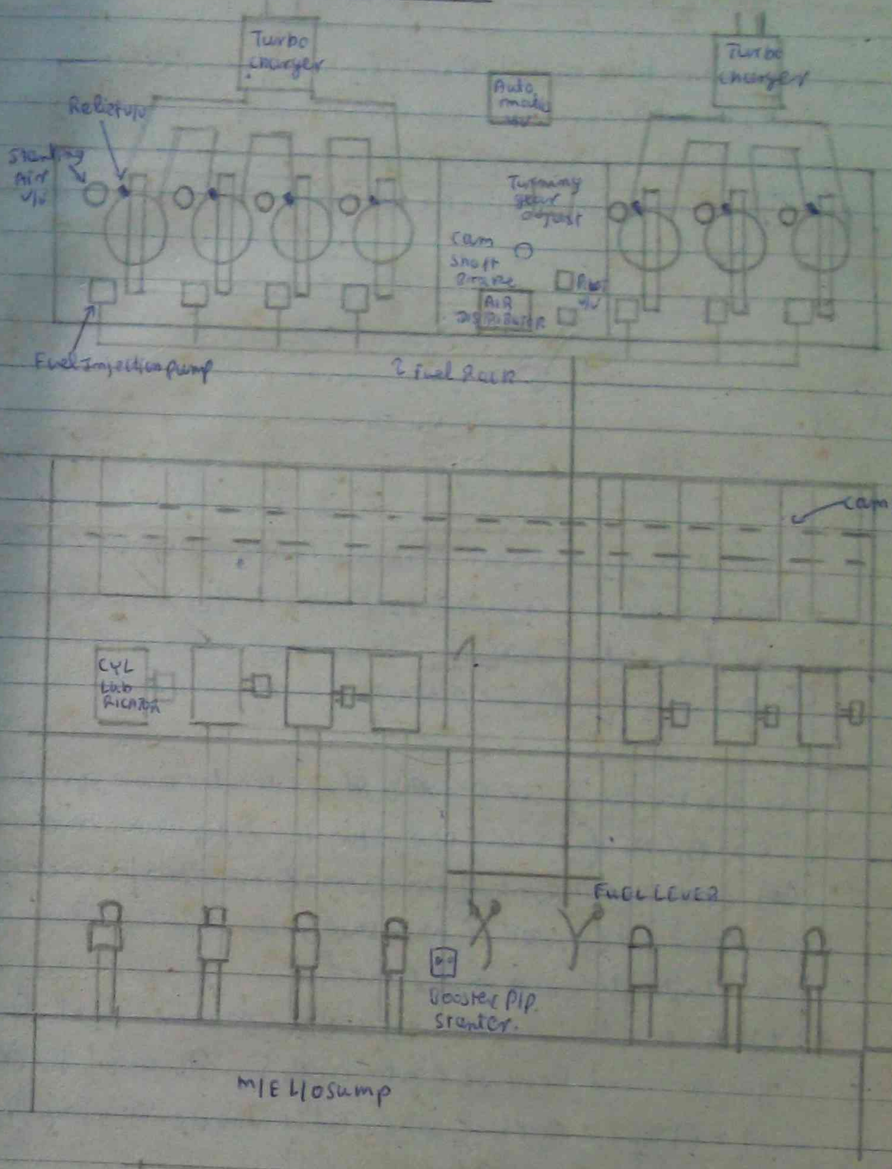
4Stroke, Aircool Diesel Engine

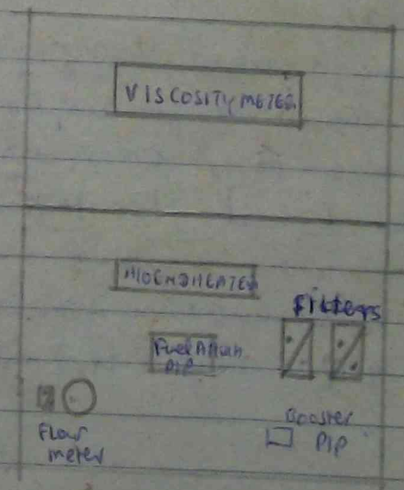
- Emergency fire pump ကို ဖြုတ်ပြီးတဲ့အခါ crankcase cover ကို ပြောင်းတပ်ရမယ်
(1) fuel pump, Hofilter တို့ကို connect လုပ်ထားတဲ့ pipe များ ဖြုတ်ရမယ်
(ပြုပြင်ရာတွင်အသုံးပြုသော shutter, No14 Boss spanner, open spanner, screw driver
(2) cover ကိုဖြုတ်ရမယ်
(3) Crank Shaft, Bearing, cam shaft တို့ကို ကိုယ်စီစီ ဖြုတ်ထုတ်ရမယ်
(4) အစားထိုးပြောင်းလဲရာတွင် ပြန်တပ်ရမယ်
(5) အစိုင်းတွေ့ပြီးနောက် ဖြုတ်ထားတဲ့ pipe များ ပြန်တပ်ရမယ်
(6) အသစ်ပြောင်းလဲတပ်ဆင်ထားသော fuel pump ကို ပြန်ဖြုတ်ရမယ်
(7) အစားထိုးပြီးသော fuel pump ကို
(8) ပြန်လည်တပ်ဆင်ရာတွင် pipe များကို Hofilter အသစ်နှင့် handle ကို ရေသောက်ဖို့ tap ကို ပြန်ပြောင်းရမယ်
(9) pipe များ ပြန်ဖြုတ်လည်တပ်ပြီး Test run ပြုလုပ်ရမယ်။

(fuel pump) - ဒီ shaft ရဲ့ eccentric အပေါ်မှာ ရောက်နေတဲ့အခါ fuel pump ကို ဖြုတ်ပြီး ကို camshaft ကို ပြန်ဖြုတ်ရမယ်

10/3/87

MAIN ENGINE OPERATION

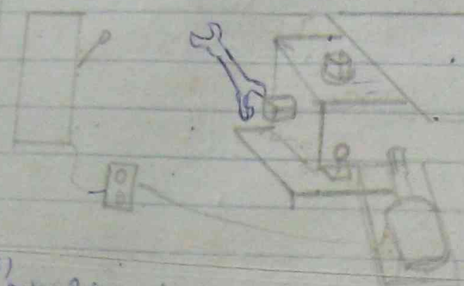




22/3/87

M/E ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಬೇಕಾದ ವಿಷಯಗಳು.

(1) Stern tube Gland ಯಲ್ಲಿ ಬರುವ ಶಬ್ದ
(2) propeller ಶಾಫ್ಟ್ ಬೇರಿಂಗ್ ಬಿಸಿಯಾಗುವುದು
(3) ಬೇರಿಂಗ್ ಲೂಬ್ರಿಕೇಟಿಂಗ್ ಆಯಿಲ್
(4) Turning gear ಜೋಡಿಸಿರುವ ರೀತಿ Turning gear ಅನ್ನು ತೆಗೆಯುವ ರೀತಿ.



(5) Main engine ಅನ್ನು forward, reverse ಮಾಡುವ ವಿಧಾನ. Forward ಆಗಿರುವಾಗ ಅದನ್ನು reverse ಮಾಡುವ ವಿಧಾನ.
(6) Turning gear ನಲ್ಲಿ flywheel ಅನ್ನು ತಿರುಗಿಸುವಾಗ ಅದಕ್ಕೆ ಲೂಬ್ರಿಕೇಟಿಂಗ್ ಆಯಿಲ್ ಸಪ್ಲೈ ಆಗುವ ರೀತಿ.
(7) ಯಾವ ಬೇರಿಂಗ್ ಅನ್ನು ತೆಗೆಯಲು dismantle ಮಾಡಲು ಬೇಕಾದ ಉಪಕರಣಗಳು.

(8) Booster pump ಗೆ ಬರುವ ಪೈಪ್ ಗಳು, Indicator cock ಗಳು ಎಲ್ಲಿ ಎಲ್ಲಿ ಇರುತ್ತವೆ. (ಅಲ್ಲಿ ಇರುವ F/W, S/W, T/O pipe ಗಳು ಬರುವ ಬಗ್ಗೆ ಮತ್ತು F/O ಪೈಪ್ ಗಳು ಬರುವ ಬಗ್ಗೆ)
(9) ಮುಖ್ಯ L/O pipe ಗಳು ಎಲ್ಲಿ ಬರುತ್ತವೆ (air cooler ಸಹ)
(9) Blow out ಮಾಡುವಿಕೆ (main stop ಗಳನ್ನು ಎಲ್ಲೆಲ್ಲಿ ಮಾಡಲಾಗಿದೆ)
(10) Indicator cock ಗಳು
(11) movement ಆಗುವ main ಗಳನ್ನು ಹೇಗೆ, ಎಲ್ಲಿ: fuel lever ಹೇಗೆ, forward reverse control ಮಾಡುವ ಸ್ಥಳ, ಯಾವ ಸ್ಥಳದಲ್ಲಿ compressor ಬರುವ ರೀತಿ, Nozzle cooling pipe ಬರುವ ರೀತಿ ಮತ್ತು ಅದನ್ನು ತೆಗೆಯುವ ವಿಧಾನ
(12) Rocker arm ಗಳು, Oil Tank ಗಳು ಮತ್ತು ಅವುಗಳ ಸ್ಥಳ. ಆ ಟ್ಯಾಂಕ್ funnel cover ಗಳು. air filter ಗಳು ಎಲ್ಲಿ ಇರುತ್ತವೆ, ಅದನ್ನು ಹೇಗೆ ಸ್ವಚ್ಛಗೊಳಿಸಬೇಕು ಎಂಬುದು.
cooling water ಪೈಪ್ (Jacket), L/O temp ಗೇಜ್ ಇರುವಲ್ಲಿ

- (ಪೈಪ್ ಗಳು ಹಾಗೂ L/O ಸಂಪರ್ಕ ಇರುವ ಸ್ಥಳಗಳು ಅವುಗಳ cunning ಬರುವ ರೀತಿ | Valves ಗಳ ಹೆಸರು ಮತ್ತು ಅವುಗಳ ಕೆಲಸ)

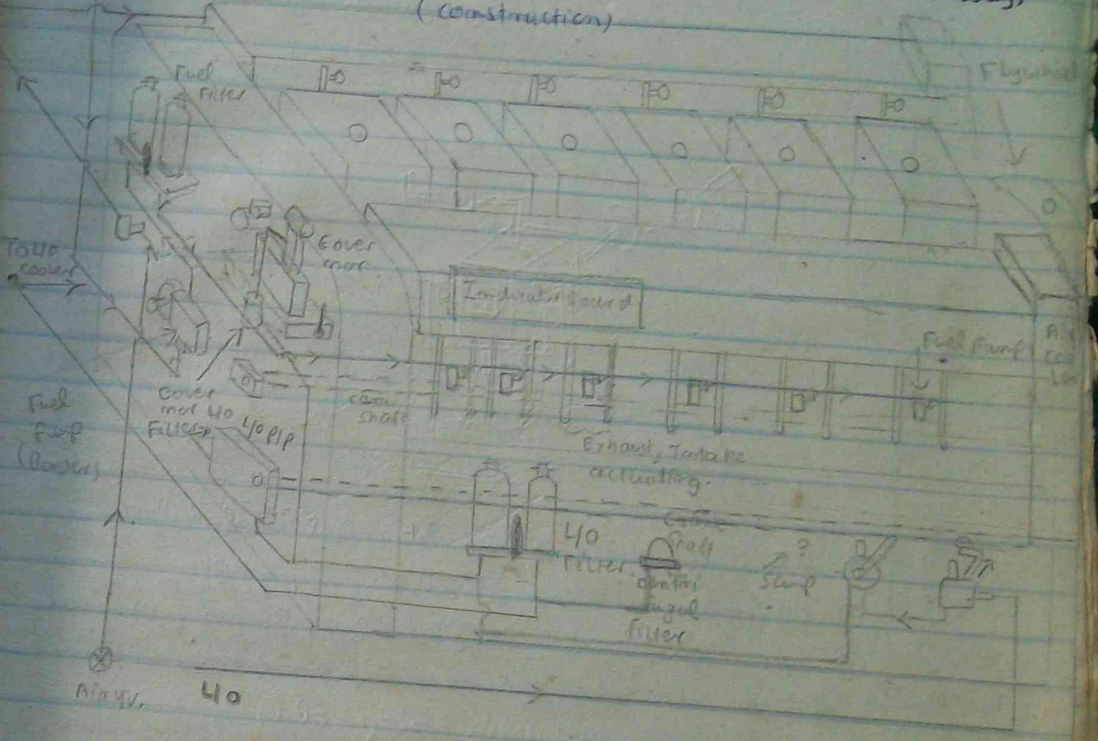
16/3/87 (fuel pump) - ಬೇರಿಂಗ್ shaft ಅನ್ನು ತೆಗೆಯುವ ವಿಧಾನ

22/3/87

Study of Generator Engine

Fuel

(construction)



Generator 123, DAIYA ENGINE, mountings.

(operation)

(1) ಹೊರಡುವ ಮುಂಚೆ
(2) Indicator cock ಗಳನ್ನು ತೆರೆದು ಗಾಳಿ ಹೊರಬರುವುದನ್ನು ಗಮನಿಸಿ ಮುಚ್ಚಬೇಕು
(3) ಹೊರಡುವ ಮುಂಚೆ, ಹಾಗು ಹೊರಟ ನಂತರ ಅರ್ಧ ಗಂಟೆಗೊಮ್ಮೆ L/O pump ನ ಪ್ರೆಷರ್ ಗೇಜ್ ಅನ್ನು ಗಮನಿಸಬೇಕು
flywheel ನ ಕೆಳಗೆ ಇರುವ L/O pump ನ ಪ್ರೆಷರ್ ಗೇಜ್ ಅನ್ನು ಗಮನಿಸಬೇಕು
(4) air valve ಅನ್ನು ತೆಗೆದು blow out ಮಾಡಬೇಕು
(5) Indicator cock ಗಳನ್ನು ತೆರೆದಿರಬೇಕು
(6) fuel lever ಅನ್ನು ತೆಗೆದು ಬಿಡಬೇಕು.

VOY 102
Mangalore
12-3-87
(Thursday)

V0 Y102
mangalore
12-3-27
(Thursday)

G/E2 nozzle cooling attach pump overhaul.

Gear Type pump.

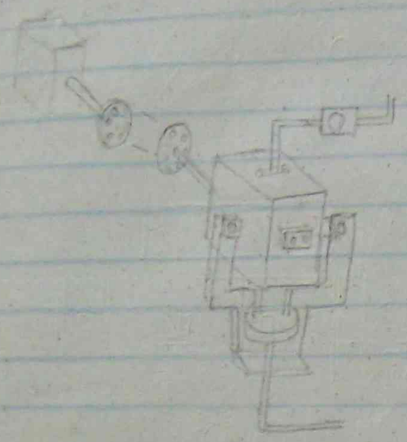
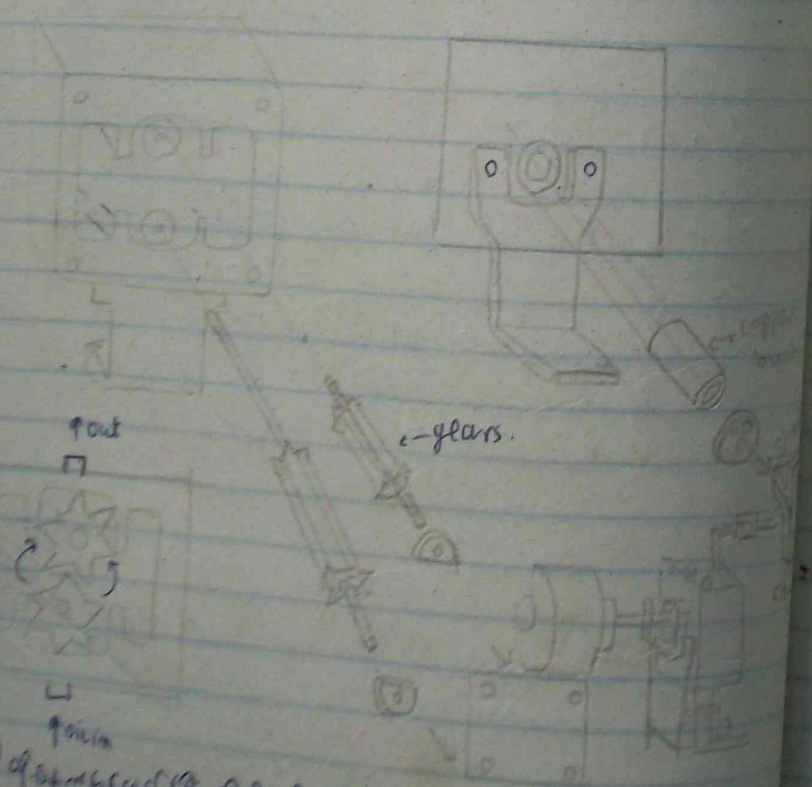


Diagram of pump with inlet, outlet, housing, gears, rubber joint, seal, cover, bolts



① Main Engine
FRIED KRUPP LIGDNZ
MOD NO- DG 750V T2BF-110
Rpm - 170
HP - 4900
BUILT - 1961

② Generator Engine
DEUTZ
MOD NO 25201/25200/25202
Rpm - 750
HP - 390
235KW - 400V, 50cycle
BUILT - 1961
Type - AB M 528
DGKLA - 210418
WNO- 456957, 456954, 456953

③ Turbo Charger
NO359
Type - TH 4011
Specification - 24411 540/220
max: Rpm - 12000
max: Gas Temp - 550°C
Rated charge Air pressure - 0.71 kg/cm²
" Quantity - 555 kg/cm²
connected to 4 cycle cylinder.
NO360
Type TH 4011
specification 24411 540/152
max Rpm - 12000
max: Gas Temp - 550
Rated charge Air pressure 0.71 kg/cm²
" " Quantity 425 kg/cm²
connected to 3 cylinder

④ L.O Purifier
Type - ON 2016
NO - 167448
m speed 6380 u/min
SPEED 1:1 RPM 65

⑤ HO purifier
Type ON 4016
NO - 1617559/1617552
motor speed - 7000 u/min
SPEED 1:1 RPM 65.

⑥ H.O Cabitier
Type - ON 4016
NO - 1617557
motor speed - 7000 u/min
SPEED 1-1 RPM 65

⑦ DO Purifier
Type ON 2016
NO 1617441
motor speed - 6320 u/min
SPEED 1-1 RPM 65.

⑧ NH3 Compressor
Type GROßE Fabrik
ARG 215 106404,
106408, 106410, 106411
BUILT - 1961
NH3 23 Lit
REFRIGERATOR
EISEMWERK
HAMBURG

⑨ PROVISION REFRIGERATION

STRA

① 112008, 1961.

2 [illegible] BSAydr

Hochstdruck 13 atü Qin

SSC

CAP 30 LIT F12

② 112013 1961

13 SSC

Cap 30 Lit F12

⑩ LATHE

ALFRED ERIKSEN

16, 20, 25, 31-5, 40, 50, 63, 80, 100

90, 112, 140, 180, 224, 280, 355, 450

600

DRILL MODEL B32

MOTOR NO - 1430

SPINDLE - 135, 250, 450, 770

DRILL - GORDIN

MOT - DT13

LINO - 600903

3~ 380V 50HZ 270W

1800, 1140, 700, 450 RPM

⑪ GRINDING

MOT - DOTH 302

LINO 540271

220 ~ 380V, 50HZ

1350W

300 x 40 x 76 WHEEL

1500 RPM

⑫ BOILER

AK [illegible] SELL SCH

WESER WERKE SEE SCH

NO 2182 JAHR 1961

BETRIEBSDRUCK [illegible]

⑬ EXHT BOILER

BERGFELDS [illegible]

CAP: 50 LITR

PRESS - 6 Kg/cm²

TEMP 90°C

[illegible]

12 KW

[illegible]

⑭ STEERING ENGINE

ATLAS WERKE

TYPE RH 44340

NO 7308

JAHR - 1961 BREMEN

⑮ MAIN Freshwater Cooling PIP

KSB

Type - RNST 200

NR - 525030, JAHR 1961

Q - 195 m³/hr

n - 1450 u/min

⑯ Res cooling PIP

Type - RE [illegible] 80V

NR - [illegible] JAHR 1961

Q - 20 [illegible] m³/hr

H - 25 m ft-s

n - [illegible] u/min

③ Main S.W Cooling PIP

KSB

Type - REXS 180V

NR - 525038, JAHR - 1961

Q - 235 m³/hr

H - 25 m ft-s

n - 1450 u/min

④ General Service pump

KSB

Type - REXS 125/125/100 - 2V

NR - 525048 JAHR - 1961

Q - 90/60 m³/hr

H - 25/50 m ft-s

n - 1450 u/min

⑤ Harbour fresh water cooling PIP

KSB

Type - REX 100W

NR - 525042, JAHR 1961

Q - 45 m³/hr

H - 21 m ft-s

n - 1450 u/min

⑥ Res: HARBOUR COOLING PIP

KSB

Type - REXS 100W

NR - 525044; JAHR 1961

Q - 45 m³/hr

H - 21 m ft-s

n - 1450 u/min

⑦ HARBOUR SEA WATER COOLING PIP

KSB

Type - REXS 100W

NR - 525046; JAHR 1961

Q - 46 m³/hr

H - 21 m ft-s

n - 1450 u/min

⑧ H.O DAV PIP

DUDEK - PUMPPEN - HAMBERG HARBURG

Type - SIN W8; m³/hr - 60

rpm - 1450, DRUCK - 35 m

⑨ L.O PIP (MAIN ENGINE)

PAUL LEISTRITZ - NIRNBERS

ÖL PUMPE NR - 010041

BAUMNSTEN - M16A/170 FLO

2300 u/min; 3-5 ATÜ

SAMGHÜ HE - 3mWS

920 u/min; BAR JAHR - 1961

⑩ BILGE PIP

KSB

Type - HKZ 130/180

NR - 525065

Q -

H -

n - 1450 u/min

⑪ Ballast PIP

KSG

Type - HKZ 210/180

NR - 525066; JAHR - 1961

Q - 126 m³/hr

H - 30 m ft-s

(13) CARGO COOLING S/W PIP NO1
KSB
Type - REXL S 65/50W
NR - 525055 ; JAHR - 1961
Q - 10 m³/hr
H - 20 m-fLS
n - 1450 u/min

(14) CARGO COOLING S/W PIP 2
KSB
Type - REXLS
NR - 525054 ; JAHR 1961
H - 20 m fL-S
n - 1450 u/min

(15) AIR CONDITIONING SW PIP NO3
KSB
Type - REXL S 80/65W
NR - 525058 ; JAHR - 1961
Q - 40 m³/hr
H - 20 m fL-S
n - 1450 u/min

(16) AIR CONDITIONING S/W PIP NO4
KSB
Type - REXLS 80/65
NR - 525059 ; JAHR - 1961
Q - 40 m³/hr
H - 20 m fLS
n - 1450 u/min

(17) BRINE PIP NO1 (Cargo)
Type - ETA 40 20M JAHR
NR - 7-101-157 856/2
Q - 15 m³/hr
H - 35 m fLS
n - 2850 u/min

(18) BRINE PIP NO2 (Cargo)
KSB
Type - ETA 40-20 M; JAHR-19
NR - 7-101-157 856/1
Q - 16 m³/hr
H - 35 m fL-S
n - 2850 u/min

(19) BRINE PIP NO3 (AIR COND)
KSB
Type - ETA 50-16K; JAHR-196
NR - 7-101-157 857/4
Q - 45 m³/hr
H - 20 m fLS
n - 2850 u/min

(20) BRINE PIP NO (4) (AIRCON)
KSB
Type - ETA 50-16K; JAHR-19
NR - 7-101-157 857/3
Q - 45 m³/hr
H - 20 m fL-S
n - 2850 u/min

(21) EJECTOR PIP
(22) CONDENSATE PIP
(23) F.W GENERATOR BRINE PIP
(24) PRO. REFERGERATION SW COOLING PIP

(25) PRO: REFRIGERATION S-W COOLING PIP (2)
(26) F.W HYDROPHONE PIP
(27) S.W HYDROPHONE PIP
(28) D.O DAY PIP
(29) DIRTY OIL PIP
(30) TURBO L.O PIP (1)
(31) TURBO L.O PIP (2)
(32) NOZZLE COOLING PIP (1)
(33) NOZZLE COOLING PIP (2)
(34) D.O AUTO TOPPING PIP (1)
(35) " " (2)
(36) WARM WATER PIP (1)
(37) " " (2)
(38) BOILER FEED PIP (1)
(39) " (2)
(40) BOOSTER PIP

(1) AIR COMPRESSOR NO (1)
BLACKE - PRANKGNTHAL
AUFR - 209006, FABR NR.
TYPE - H2K 1125 ; Q = 180 cbm/STD
P = 25 ATO ; u/min - 970
PS - 45

(2) AIR COMPRESSOR NO (2)
BLACKE - PRANKEXITAL
AUFTR - 209007 ; FABR
Type - H2K 1125 Q = 180 cbm/STD
P = 25 ATO ; u/min - 970
PS - 45

(3) OILY WATER SEPARATOR
HEINZ GASTER INC
BREMEN
APPARATUS NR - 1359/10070
BAUJAHR - 1961

(5) F.W GENERATOR
ATLAS
DENMARK
FRESH WATER GENERATOR
Type - AFG 31 NO 473

(5) PROVISION COOLING SEAWATER PIP
MODEL - NO 3HONO
NR - 525050151
KLEIN - SCHANZLIN & BRENER

(6) VERTICAL SELF PRIMING CENTRIFUGAL PIP
MODEL - REXS 180V
NO - 525041

(7) SEAWATER COOLING PIP
MODEL - REXS 180V
NO - 525039

(8) VERTICAL NONSELF PRIMING CENTPIP
TYPE - REXS-180V
NO - 525037

(9) VERTICAL SELF PRIMING CENT
MODEL - REXS 100W
NO - 525047
Stand by harbour cooling water pump

(10) CONDENSER SEAWATER COOLING Pump
MODEL - A0 4124 KHO
NO - 525063
Type - REX 100W

(1) Harbour S/w cooling P/P

MODEL - REX 15
REX 100W
NO 525045

(12) Generator Engine 12 B

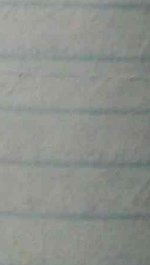
DAIWA DIESEL ENGINE
Type - G 5 AC 15
ENGINE NO - 610062
HP - 400
RPM - 750
DATE - SEP 1980
MITSUBISHI HEAVY
INDUSTRIES LTD (JAPAN)

VOL 102
MANGALORE
13-3-87

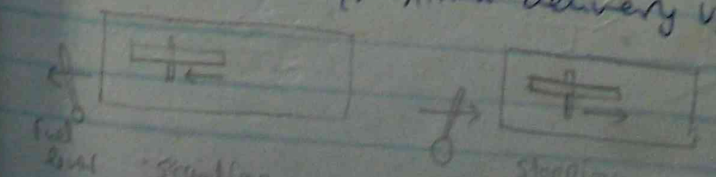
Disassembling plunger, barrel of G/E 2 & Refitting

(1) M41 & M10 open spanner
(2) Screw driver
(3) barrel fixing lock nut screw ಕೀ. ರಂಧ್ರ in cm: 6
(4) M41 open spanner ಇಟ್ಟು ಕೊಂಡು
ಅಡ್ಡಡ್ಡಲಾಗಿ
(5) spring ತೆಗೆಯಿರಿ
(6) plunger, bracket ಅಂಚಿನ ಮೇಲೆ
ಸ್ಕ್ರೂ ಡ್ರೈವರ್ ಸಹಾಯದಿಂದ ತೆಗೆಯಿರಿ
(7) barrel ಅನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ತೆಗೆಯಿರಿ

Plunger, helix ಕೆಳಗೆ, barrel ಕೆಳಗೆ hole ಇದೆ, ಇದು ಎಂಜಿನ್ ಚಾಲನೆಯಲ್ಲಿದ್ದಾಗ
ಸ್ವಲ್ಪ helix ಮತ್ತು hole ಮೂಲಕ ಇಂಧನ ಪೂರೈಕೆ, ಮತ್ತು ಹೆಚ್ಚುವರಿ return line ಮೂಲಕ
ಟ್ಯಾಂಕಿಗೆ ಹಿಂತಿರುಗುತ್ತದೆ. ಈ plunger ಅನ್ನು ತೆಗೆದಾಗ ಇಂಧನ ಸರಬರಾಜು
(Air ಒಳಗೆ ಸೇರಿಕೊಳ್ಳದಂತೆ ಎಚ್ಚರಿಕೆ ವಹಿಸಿ ತೆಗೆಯಿರಿ)



(ಬಾರ್ ಇರುವ plunger helix ಅನ್ನು ಮೊದಲು ತೆಗೆಯಿರಿ)
Engine ನಿಲ್ಲಿಸಲು fuel lever ಅನ್ನು ಕೆಳಗೆ ತಳ್ಳಿ plunger rack ಅನ್ನು ಮುಂದಕ್ಕೆ
ತಳ್ಳಿದಾಗ ಇಂಧನ ಪೂರೈಕೆ ನಿಲ್ಲುತ್ತದೆ. ಇದರಿಂದ helix ಕೆಳಗೆ hole ಮೂಲಕ ಬರುವ ಇಂಧನ
ಹಿಂತಿರುಗಿ return ಆಗುವ ಬದಲು delivery V/V ಮೂಲಕ ಹೋಗುತ್ತದೆ.



ಇಲ್ಲಿ fuel lever ಅನ್ನು
stop ಸ್ಥಾನದಲ್ಲಿಟ್ಟಾಗ
ಇಂಧನ ಪೂರೈಕೆ ಸ್ಥಗಿತ.