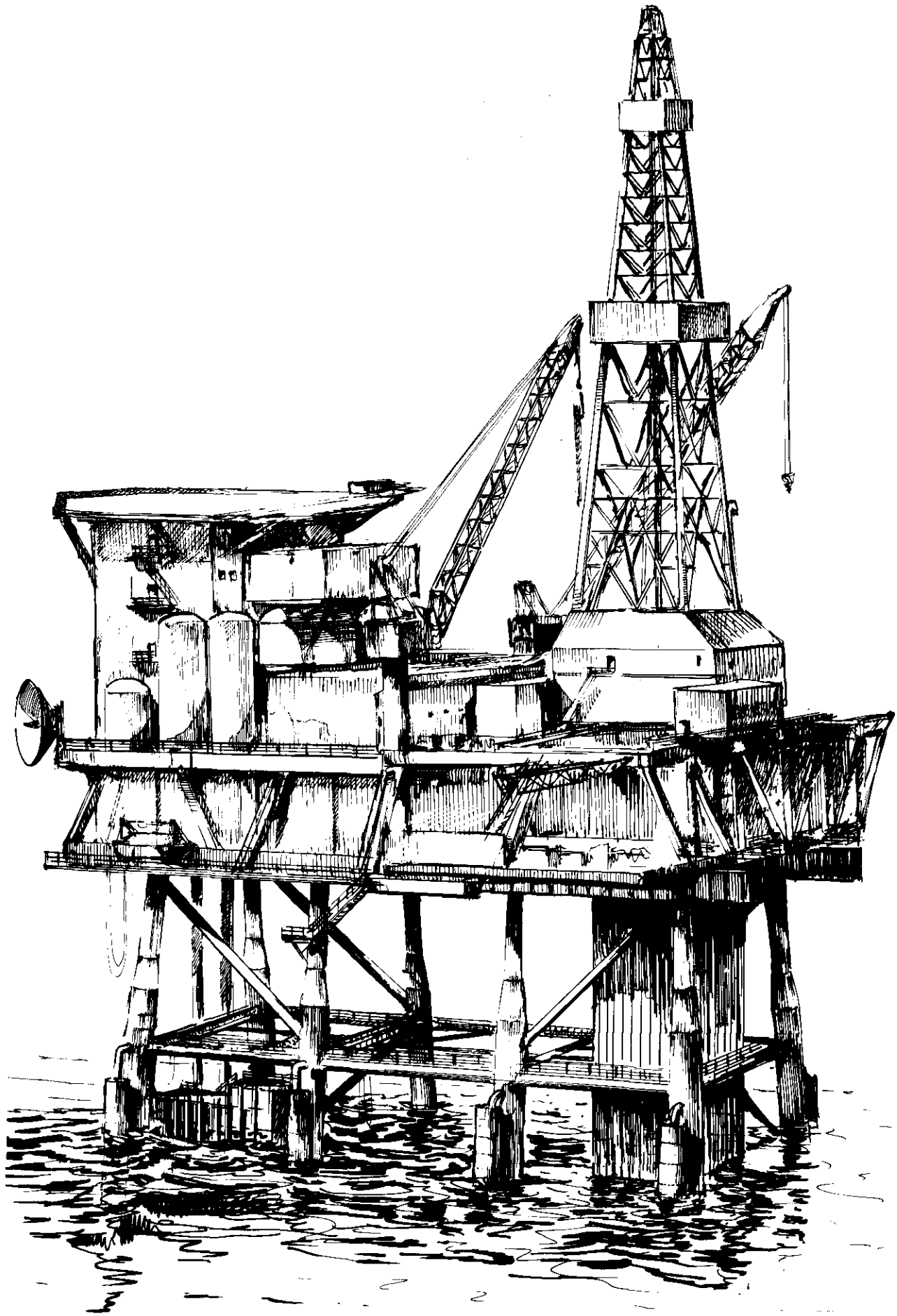
elf aquitaine norge a/s

FRIGG FIELD

DP2

VOL 1
OPERATIONS MANUAL

Norsk Hydro | statoil | TOTAL



ISSUE 1. OCTOBER 1980

FRONTISPIECE

Elf Petroleum Norge a/s	MAINTENANCE DEPARTMENT FRIGG FIELD DP2	Ref.: Revision date: Page

RECORD OF AMENDMENTS

Revision	Date issued	Description	Amended by (signature)	Amendment date
0		Original issue		
		Update Pg 6 ,Diag.10.13.1 to 10.13.12	R.Guyomard	16.3.93
		Verified	R.Guyomard	14.4 93

FRIGG FIELD

PLATFORM DP2

VOLUME 1 OPERATIONS MANUAL

CONTENTS

This is a management document and is the principal document submitted for certification. It contains a summary description of the structure, production utilities and safety systems for guidance and reference at management levels.

It is also intended to serve the additional purpose of providing the operators with operating philosophies and data, and a summary of machinery systems' layouts and platform safety.

PIPING/FLOW SYMBOLS

GATE VALVE

BALL VALVE

CHECK VALVE

ANGLE VALVE

THREE-WAY VALVE

DIAPHRAGM OPERATED CONTROL VALVE

POWER OPERATED VALVE

SOLENOID OPERATE VALVE

SAFETY RELIEF VALVE

CHOKE VALVE

FILTER

FLAME ARRESTER

BLIND FLANGE

HOSE CONNECTION

SCREWED CAP

ROTAMETER

FLEXIBLE HOSE

BURSTING DISC

ELECTRIC MOTOR DRIVEN CENTRIFUGAL PUMP

ELECTRIC MOTOR DRIVEN RECIPROCATING

ELECTRIC MOTOR DRIVEN ROTARY GEAR PUMP

SUBMERGED PUMP

OPEN DRAIN

FIRE CANNON MONITOR

ORIFICE TYPE PRIMARY ELEMENT

HOSE REEL

MOTOR DRIVEN FORCED DRAUGHT HEAT EXCHANGER

MAINFLOW FIRE AND DIRECTION

SECONDARY FLOW LINE AND DIRECTION

FLOW LINES JOINING

FLOW LINES CROSSING

INSTRUMENT PNEUMATIC LINE

INSTRUMENT ELECTRICAL LINE

FLOW ABBREVIATIONS

FC	FAIL CLOSED	NC	NORMALLY CLOSED
FO	FAIL OPEN	NO	NORMALLY OPEN
HCV	HAND CONTROL VALVE	PCV	PRESSURE CONTROL VALVE
LCV	LEVEL CONTROL VALVE	ROV	REMOTE OPERATED VALVE
MOV	MOTOR OPERATED VALVE	TCV	TEMPERATURE CONTROL VALVE

INSTRUMENT SYMBOLS

LOCAL MOUNTED INSTRUMENT

LOCAL PANEL MOUNTED INSTRUMENT

MAIN PANEL MOUNTED INSTRUMENT

LAL — LOW LEVEL ALARM

LC — LEVEL CONTROLLER

LI — LEVEL INDICATOR

LIS — LEVEL INDICATOR SWITCH

LS — LEVEL SWITCH

PAL — LOW PRESSURE ALARM

PB — PUSHBUTTON

PI — PRESSURE INDICATOR

PS — PRESSURE SWITCH

PSL — LOW PRESSURE SWITCH

PIG SIG — PIG DETECTOR

TS — TEMPERATURE SWITCH

FT — FLOW TRANSMITTER

FE — FLOW ELEMENT

GLOSSARY OF SYMBOLS

DP2 Operation Manual

List of Contents

Chapter 1 Introduction

Chapter 2 Platform Structure

Chapter 3 Equipment Location

Chapter 4 Drilling Package

Chapter 5 Production Facilities

Chapter 6 Utilities

Chapter 7 Transport Facilities

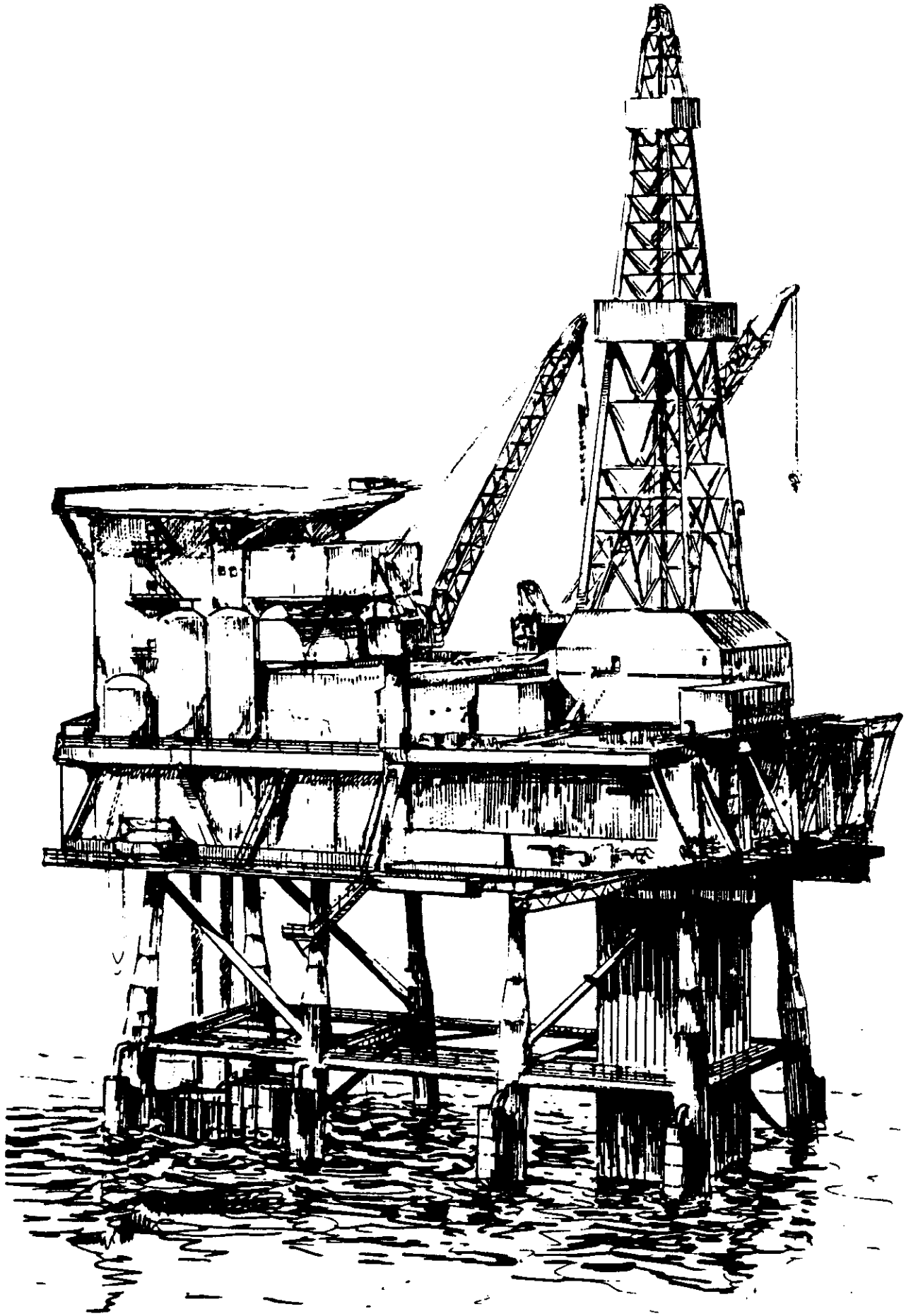
Chapter 8 Materials Handling

Chapter 9 Communications

Chapter 10 Safety

Chapter 10 Con't

		Title		Issue
Section	10.13	Escape Routes		1.Oct. 80
Diagram	10.13	Escape Routes	symbol legend	2.March 93
Diagram	10.13.1	Escape Routes	Helid. & Upper Drill. De.	2.Sept. 92
Diagram	10.13.2	Escape Routes	Living Quart. Lev. 1	3.Sept. 92
Diagram	10.13.3	Escape Routes	Living Quart. Lev. 2	2.Sept. 92
Diagram	10.13.4	Escape Routes	Living Quart. Lev. 3	3.Sept. 92
Diagram	10.13.5	Escape Routes	Living Quart. lev. 4	2.Sept. 92
Diagram	10.13.6	Escape Routes	Interm. Deck	2.Sept. 92
Diagram	10.13.7	Escape Routes	Low. Drill. Deck	4.Febr. 93
Diagram	10.13.8	Escape Routes	Prod. Deck. Mods. 1,2,3	3.Sept. 92
Diagram	10.13.9	Escape Routes	Prod. Deck. Mod. 4	4.Febr. 93
Diagram	10.13.10	Escape Routes	Pumphouse	1.Sept. 92
Diagram	10.13.11	Escape Routes	Deck Supp. Frame	3.Sept. 92
Diagram	10.13.12	Escape Routes	Top of Jacket	3.Sept. 92
Section	10.14 Page 1	Emergency lighting		1.Oct. 80
Section	10.14 Page 2	Emergency lighting		1.Oct. 80
Diagram	10.14	Emergency lighting		1.Oct. 80
Section	10.15 Page 1	Lifesaving Equipment		1.Oct. 80
Section	10.15 Page 2	Lifesaving Equipment		1.Oct. 80
Section	10.15 Page 3	Lifesaving Equipment		1.Oct. 80
Section	10.15 Page 4	Lifesaving Equipment		1.Oct. 80
Diagram	10.15.1	Lifesaving Equipment	Lifeboat, Davit, Winch	1.Oct. 80
Diagram	10.15.3	Lifesaving Equipment	Liferaft, Davit, Winch	1.Oct. 80



ISSUE 2 OCTOBER 1984

FRONTISPIECE

CHAPTER 1

INTRODUCTION

Contents

DIAGRAMS

FRIGG FIELD LOCATION

1. GENERAL

The Frigg Field is a natural gas field which straddles the line between the Norwegian and UK Sectors of the North Sea Continental Shelf, in blocks 25/1 and 10/1, between 59 degrees 48' and 60 degrees oo' North and between 01 degrees 97' and 02 degrees 15' East (European datum 1960). It lies some 190 km from the Norwegian coast and 370 km from the Scottish coast. The location of the field layout is shown on diagram 1.1.

2. PLATFORMS

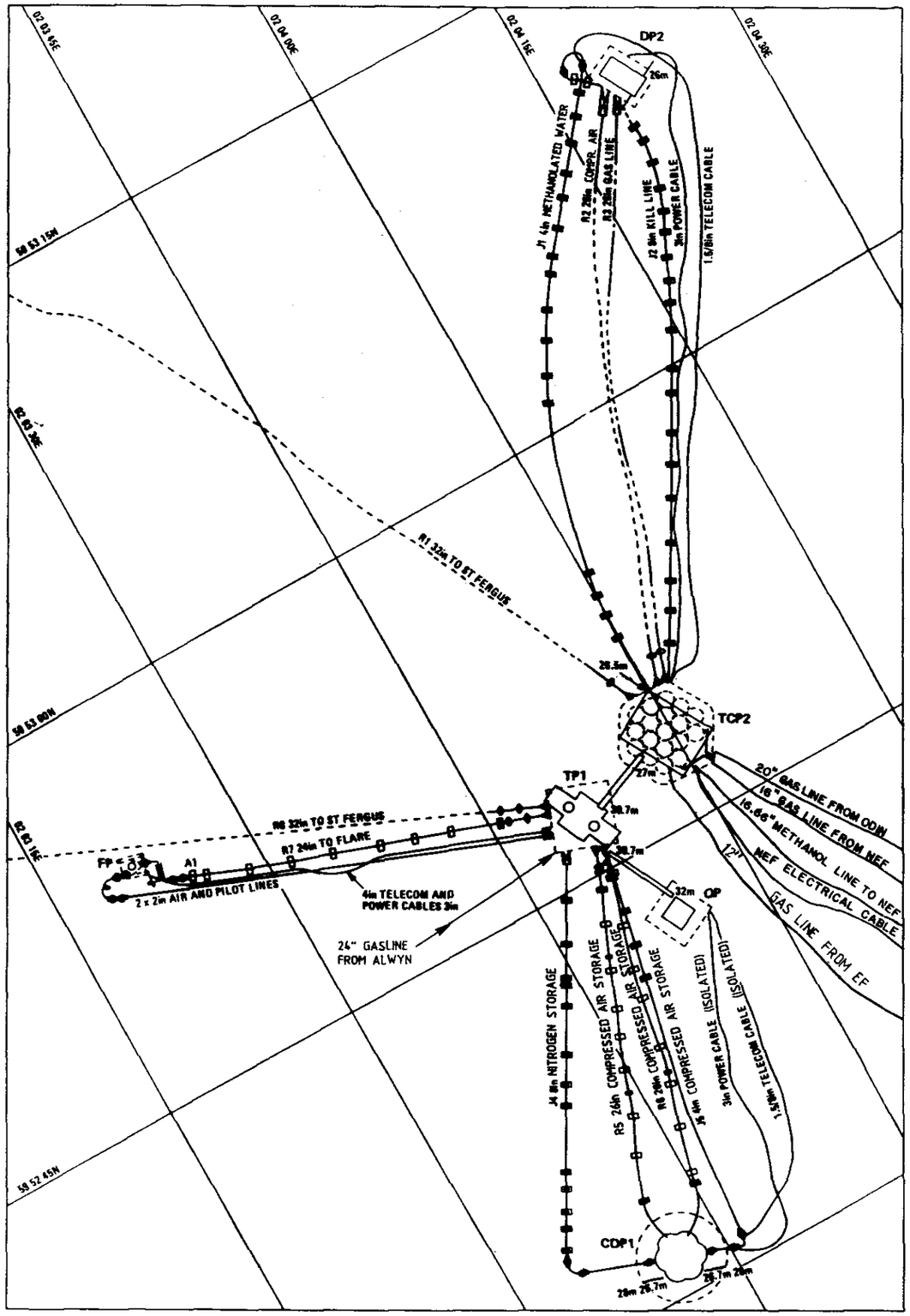
There are six platforms, four located in the UK Sector and two in the Norwegian Sector.

3. SATELLITE FIELDS

The East Frigg Field is located on the boundary of the blocks 25/1 and 25/2 some 18 km from Frigg Centre.
The North East Frigg Field is located in block 25/1 - 30/10 som 18 km from Frigg Centre.

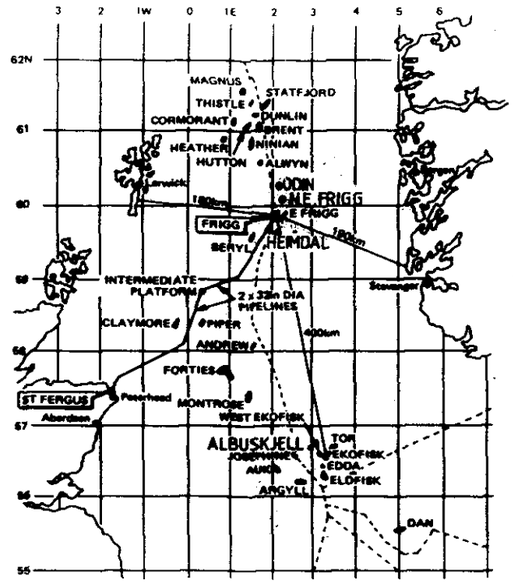
4. INTERCONNECTED FIELDS

ODIN - 30/10
ALWYN - 3/9 (UK Sector)



NOTE

RIP RAP EXTENDS FROM TP1 TO CONCRETE BLOCK A1 ON R7 24in FLARE LINE



PLATFORM CO-ORDINATES

STRUCTURE	GEOGRAPHICAL CO-ORDINATES	UTM CO-ORDINATES	TRUE ORIENTATION
DP1 MAST	59° 52' 46" 716 N 02° 04' 46" 766 E	6 638 334.36 N 448 685.95 E	—
DP2	59° 53' 16" 975 N 02° 04' 28" 684 E	6 639 268 88 N 448 688 88 E	332° 52' 12"
TP1/4	59° 52' 47" 276 N 02° 03' 51" 366 E	6 638 548 74 N 447 616 38 E	335° 28' 28"
TCP2	59° 52' 46" 446 N 02° 03' 59" 536 E	6 638 504 14 N 447 743 92 E	331° 03' 06"
OP	59° 52' 42" 421 N 02° 03' 53" 826 E	6 638 388 88 N 447 652 98 E	334° 17' 43"
CDP1	59° 52' 31" 388 N 02° 03' 41" 745 E	6 638 088 38 N 447 488 81 E	016° 37' 41"
FP	59° 52' 53" 519 N 02° 03' 21" 293 E	6 638 748 50 N 447 156 50 E	—

KEY

UNBURIED LINE	GREASE BOX
BURIED LINE OR LINE IN A TRENCH	SEAL PROTECTION
CONCRETE BLOCK (25t)	SEAL PROTECTION WITH FLOW LIMITER
CONCRETE BLOCK (18t)	SEAL PROTECTION WITH PERMANENT SEAL
CONCRETE SADDLES	HYPERBARIC WELDING POSITION
GROUT BAG / GROUT BAG NOT IN USE	28m CLEARANCE UNDER BRIDGE
MATTRESS	

REV. 6, AUG. 1991

FRIGG FIELD – LOCATION 1.1

FRIGG FIELD - SUMMARY OF INSTALLATION

1. GENERAL

Gas produced from the Frigg Field is transported to a treatment terminal at St. Fergus, Scotland, through two parallel 32" diameter pipelines.

2. PLATFORMS

2.1 The function of each Frigg Field platform is as follows :

(a) CDP1 is registered "10/1 - FRIGG - CDP1" as an offshore installation. It is a concrete structure standing in 97m of water. The platform is now abandoned.

(b) DP2 is registered "25/1 - FRIGG - DP2" as an offshore installation. It is an eight-legged steel lattice structure anchored by piles, and stands in 98m of water, and serves as a support for 24 wells and living quarter.

(c) QP is registered "10/1 - FRIGG - QP" as an offshore installation. It is a steel jacket-type structure of four tubular legs, and stands in 104m of water. It is equipped with living quarters capable of accomodating 120 persons.

(d) TP1 is registered "10/1 - FRIGG - TP1" as an offshore installation. It is a concrete structure with a parallel piped base surmounted by two columns supporting a steel deck, and stands in 103m of water. Gas produced and treated on Alwyn is transported to the St. Fergus terminal via this platform through 1 of 2 methods :

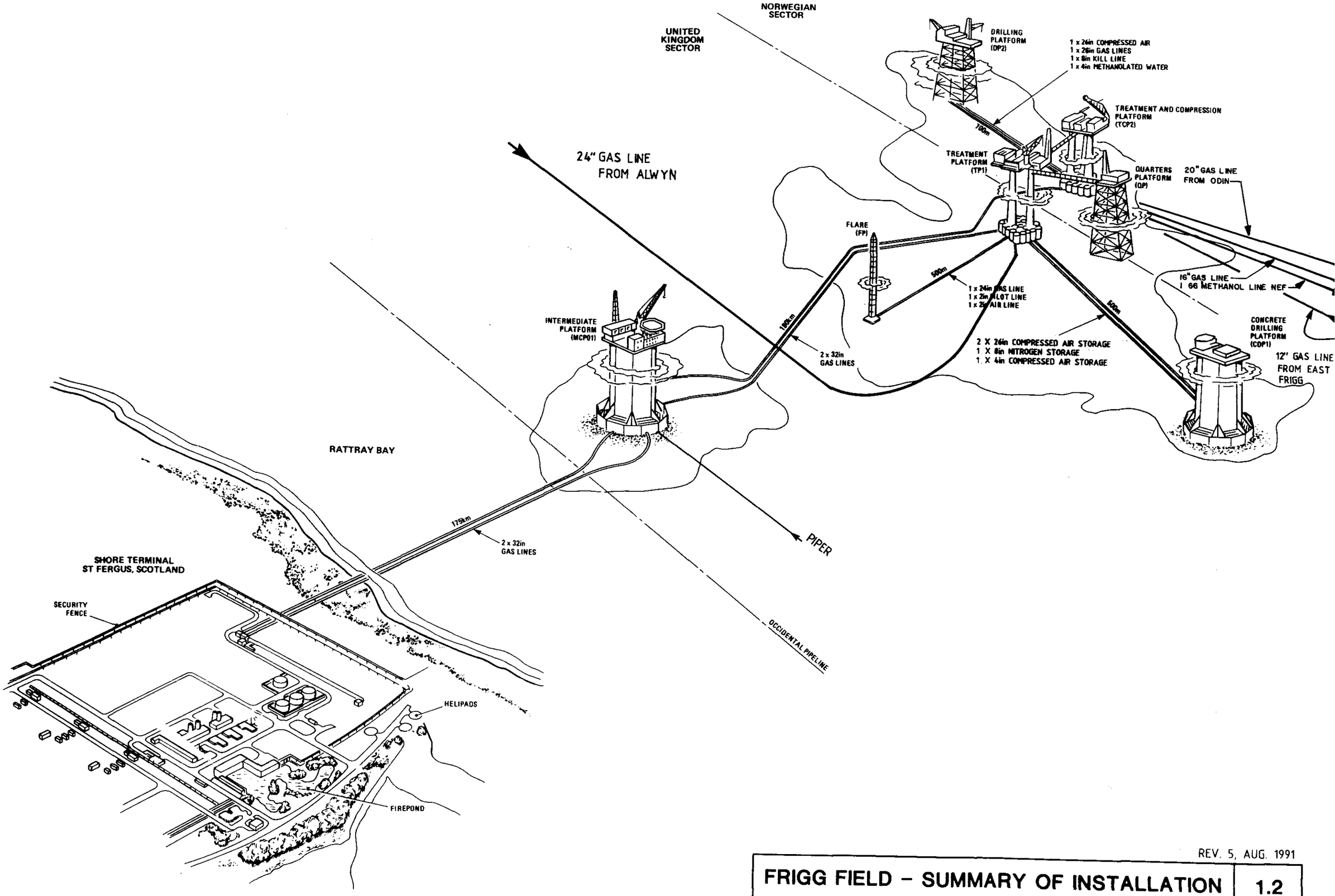
i) Through TP1 sales gas header **or**
ii) Through TCP2 via the TP1/TCP2 dry gas Interconnection Line

(e) TCP2 is registered "25/1 - FRIGG - TCP2" as an offshore installation. It is a concrete structure with a hexagon caisson base surmounted by three columns supporting a steel deck, and stands in 103m of water. Gas produced by DP2, North East Frigg, East Frigg and Odin is treated and compressed on this platform before being transported to the St. Fergus terminal.

(f) FP is registered "10/1 - FRIGG - FP" as an offshore installation. It is a steel articulated column with a concrete ballasted steel base, and stands in 106m of water. It is provided to depressurise TP1 and TCP2 process equipment and sealines.

2.2 The three central platforms, TP1, TCP2 and QP are linked by bridges. Drilling/production platform DP2 is located 800m from its treatment platform. The NEF Field Control Station and subsea equipment are some 18km north-east of Frigg. The East Frigg Subsea production facilities are some 18km east of Frigg.

2.3 Interconnected fields ODIN and ALWYN.



REV. 5, AUG. 1991

FRIGG FIELD – SUMMARY OF INSTALLATION	1.2

FRIGG FIELD PROCESS FLOW

1. GENERAL

1.1 The Frigg Field installation produces, treats, meters and exports natural gas to St. Fergus terminal. At St. Fergus the gas is further treated before it is distributed to consumers through the British Gas Council network.

2. DESCRIPTION

2.1 Gas from 11 producing wells on DP2 passes through one 26" flowline to TCP2. The scrubber desanders installed downstream of each wellhead on DP2 are now bypassed, apart from well A22A where the scrubber is still in operation for observation reasons.
A maximum wellhead pressure of 172 barg and a gas flow rate of 2.0 to 2.5 MMSCMD has been allowed for in the design of scrubber desanders, valves and pipework. Two wells (well 22/24) on DP2 are used for observation purposes and one well (well 3) is for liquid injection (including methanolated water from ODIN, NEF and East Frigg) from TCP2.

2.2 Gas produced by NEF and EF is transported to TCP2 through a 16" and a 12" pipeline for treatment and compression before being transported to St. Fergus terminal. Gas produced by Odin is transported to TCP2 through a 20" line for treatment and compression before being transported to St. Fergus.

2.3 The gas produced and treated on the Alwyn field is transported to TP1 through a 24" line then transferred to the 32" sea line on its way to St. Fergus terminal. There is also the facility to transfer the Alwyn gas to St. Fergus from TCP2 via the TP1/TCP2 dry gas Interconnection Line.

2.4 On TCP2 the gas is treated to prevent water condensation and hydrate formation during its transportation to St. Fergus. Gas compression equipment is installed to boost gas pressure prior to dehydration and pipeline export to St. Fergus. Three parallel treatment streams are installed; each designed for a maximum flow of 15MM SCMD. Two streams are available for operation, one stream is passivated. Each stream contains a separator, glycol contactor and glycol regeneration unit. In addition one FWKO vessel is implemented in the Odin stream process equipment.

2.5 A 32" dry gas interconnection is provided between TP1 and TCP2. Thus after the gas has been metered it can be exported through the sub-sea line of either platform to St. Fergus. This 32" line may also be used to equalize the pressure between the export lines, if required.

.6 When exporting to St.Fergus terminal via TP1 platform there is the facility to inject condensate into the line from TCP2 through a 3in interconnection line between TCP2 and TP1.

2.7 In addition to the main interconnection lines between TP1 and TCP2, the following interconnection lines are installed.

2.7.1
A 3in line to transfer slops from V47 on TP1.

2.7.2
A 3in line for methanol transfer to/from TCP2.

2.7.3
A 2in line to transfer the sump from V13 on TP1.

2.7.4
A 2in line for glycol transfer to/from TCP2.

2.8 In an emergency, gas can be flared through the flare platform (FP) at a very high rate to depressurize TCP2 platform. TP1 is connected to FP by a 24 inch subsea line; TCP2 is connected into the start of the sea lineon TP1 via the inter-platform bridge. FP is certified for a continous flow rate of 10 MMSCMD with a maximum allowable short period flow rate of 34 MMSCMD. As the flaring of the gas only takes place as of an emergency or major process upset, FP normally operates as a cold flare. The ingress of air and hence the formation of an explosive mixture is prevented by sweeping the system with nitrogen at a continous flowrate of 2400 SCMD.

A 20 inch diameter cold vent stack is provided on TP1 as a back-up to the main flare platform, but depressurization must be limited to 6 MMSCMD when this is in use.

This back-up system has been modified to handle low temperature gas as a result of ALWYN gas arriving on TP1 at low temperature. Consequently the cold vent system acts as a permanent relief system for equipment and piping handling cold gas as well as being a back-up system for the flare platform.

On TP1 all relief lines from live systems are directed to LT relief system (V47), as the HP relief system is passivated.

Control and display devices for the Frigg Field process installation, NEF, EF, ODIN and ALWYN are contained on QP. More advanced equipment, the FCDA is installed both in CCR on QP, and in Compression Control Room on TCP2, to operate the East Frigg process equipment.

TP.1

BRIDGE

TO MCP 01

FROM E.F.

FROM NEF.

FROM ODIN

CV 310

CV 311

CV 210

CV 211

CV 1A

CV 201

CV 1C

DP.2

EAST CLUSTER

WELLS 13-24

WEST CLUSTER

WELLS 1-12

R3 26" SEALINE A

TCP.2

TO FUEL GAS PACKAGE

TO FUEL GAS PACKAGE

R1 32" SEALINE 1

R5 32" SEALINE 5

FROM ALWYN

ESDV EMERGENCY SHUTDOWN VALVE

HIGH PRESSURE RELIEF VALVE @BLOWDOWN

HV LOCALLY OPERATED HYDRAULICALLY ACTUATED VALVE

ROV REMOTE OPERATED VALVE

LT VENT LOW TEMPERATURE VENT

FL H.P. RELIEF TO FLARE

CHECK VALVE

SPACER

NOTE:
ONLY ACTIVE LINES
ARE SHOWING ON THIS DRAWING

rev.	date	DESCRIPTION	by	app.
13	15.07.91	UPDATING	KMV	D.G
12	15.05.91	UPDATING	ABT	-
11	17.01.91	UPDATING	A.B.T	-
10	23.11.90	TP1 PIPE CAPPING ADDED	A.B.T	D.G.
09	1.6.90	UPDATED	W.T	D.G.
08	oct. 89	TP1 NOW AS A RISER PLATFORM	W.T.	R.As.
07	aug 89	NEF / ODIN X-OVER AND SUCT / DISCH LINES ADDED	D.G.	R.A.
06	oct 88	NEF / E.F. BY-PASS ADDED	D.G.	R.A.
05	aug 87	REDRAWN, E.F. AND ALWYN ADDED	D.G.	T.E.H.

intergraph 5000A-NY

elf aquitaine norge a/s p.o.box 168-4001 Stavanger

Installation | System

GENERAL SCHEME OF MAIN GAS PROCESS LINES

Job no. —

Scale —

FRIGG FIELD

Drwg no. FF 00 00 00 5000

Rev. 13

Sheet 1/—

GAS/LIQUID SEPARATION

CONDENSATE/WATER SEPARATION

WATER TREATMENT

WATER DISPOSAL

V5 SUMP CAISSON (Q.P.)

V47 K.O. DRUM

2"

3"

2"

2"

DECK DRAIN TREAT AREA

V13 SUMP CAISSON

P P3

TO SEA

TO V13 VIA PROCESS DRAINS

3" CONDENSATE TO SALES GAS LINE 1

2"

3"

TP1

BRIDGE

HP & LP OILY WATER FROM COMP

TO VENT

2"

3"

TCP2

CSP 24 LP VENT STACK

CV14 COND SEPARATOR

TO VENT

GAS TO COMP OR GLYCOL CONTACTORS

CV1C FWKO SEPARATOR

FROM DP2

2"

8"

10"

GLYCOL INTERCONN.

CV3 CONDENSATE SURGE TANK

4"

CV 5 OIL SKIMMER

CP9A & B

2"

DECK DRAIN COMP AREA

DECK DRAIN TREAT AREA

CV13 SUMP CAISSON

P CP3

TO SEA

3"

CP2A & B

ANALYZER

1"

CONDENSATE METERING

3"

CONDENSATE TO SALES GAS LINE 2

12"

CV 33 CONDENSATE RECYCLE TANK

CP15A & B

4"

CQ14 FLOTATION UNIT

FLOATION AID

CP25A & B

FROM ODIN

CV 1A FWKO SEPARATOR

CV 201 GAS SCRUBBER

TO COMP

3"x4"

10"

CE 203

COND HEATER

CV 204 COND/METHWATER SEPARATOR

(ODIN)

CONDENSATE METERING

TO VENT

CV 220 METHWATER FLASHDRUM

4" SEA LINE TCP2 / DP2

FA 106 FILTER

WELL 3

FROM NEF

CV 210 FWKO SEPARATOR

CV 211 GAS SCRUBBER

TO COMP

8"

CE 211

COND HEATER

CV 213 COND/METHWATER SEPARATOR

(NEF)

CONDENSATE METERING

TO VENT

CP224

CV 222 METHANOLATED WATER TANK

CV 9 METHWATER STORAGE TANK

CP 227

CP222A & B

CV 49 FILTERS

FROM EF

CV 310 FWKO SEPARATOR

CV 311 GAS SCRUBBER

TO COMP

2"x2"

4"

CE 311

COND HEATER

CV 313 COND/METHWATER SEPARATOR

(EF)

CONDENSATE METERING

TO VENT

CV 320 METHWATER FLASHDRUM

NOTE
ONLY ACTIVE LINES ARE SHOWN ON THIS DRAWING.

rev.	date	DESCRIPTION	by	app.
3	8/91	UPDATED	DG.	
2	6/90	UPDATED FOR TP1 AS A RISER PLATFORM	DG.	DG.
1	2/90	UPDATED	TB.	DG.
0	3/87	FIRST ISSUE	DG.	T.E.M.

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Installation	System

GENERAL SCHEME OF LIQUID TREATMENT LINES

Job no.

Scale

FRIGG FIELD

Drwg. no. FF 00 00 00 5002

Rev. 3

Sheet

R.DC.ELF.581.044

LEGEND

- ESDV — EMERGENCY SHUTDOWN VALVE
- ESDV — HIGH PRESSURE RELIEF VALVE (BLOWDOWN)
- HV — LOCALLY OPERATED HYDRAULICALLY ACTUATED VALVE
- CHECK VALVE
- SPACER

SP45

SEALINE

FP

FROM NITROGEN GENERATION UNIT Q18

FROM 1" SERVICE LINE

FROM E.F.

FROM N.E.F.

FROM ODIN

FROM DANIEL VENT

67 X 02

FROM COMPRESSOR L.P. VENT

FROM DP2

FROM PGV CV24

FROM PGV CV3

CV 310

CV 311

CV 210

CV 211

CV 1A

CV 201

CV 226

CV 1C

CV 24

CV2-B

CV2-A

BRIDGE

TCP.2

11E01A F.G. PACKAGE

11E01B

11E01C

11K01A B01

11K01B B01

11K01C B01

11 B02A

11 B02B

V 47

R8 32" SEALINE 1

R1 32" SEALINE 2

NOTE
ONLY ACTIVE LINES ARE SHOWN ON THIS DRAWING.

3	12-6-94	UPGRADED	GIL
2	15-4-94	UPGRADED FOR TPI AS A RISER PLATFORM	FC
1	28-9-93	UPGRADED	GIL
A	24-8-87	FIRST ISSUE	GIL
rev.	date	description	by

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Installation	System
Job no.	GENERAL SCHEME OF HP AND LT VENT LINES
Scale	
FRIGG FIELD	Drwg no. FF 00 00 00 5003 Rev. 3 Sheet

R.DC.FLE.581.045

CHAPTER 2

PLATFORM STRUCTURE

CONTENTS

DIAGRAMS

PLATFORM CONSTRUCTION

1. GENERAL

1.1 The platform was constructed in two parts, namely a fabricated tubular steel jacket surmounted by a steel deck structure.

1.2 The jacket extends from the seabed to the top of the deck skid beams at elevation +24.385m. The deck structure mounted on the deck skid beams extends to the top of the Drilling Package skid beams at elevation + 32.79m.

1.3 The structure was designed by McDermott-Hudson, London, and fabricated as follows:

(a) Jacket - Union Industrielle et d'Entreprise, Cherbourg, France.

(b) Deck Structure - Union Industrielle et d'Entreprise, St Wandrille, France.

2. DESIGN CODES

The platform was designed and built to comply with the following codes and regulations:

American Institute of Steel Construction - Manual of Steel Construction, 7th Edition, June 1973.

American Petroleum Institute - API RP2A - API Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms, 6th Edition, 1975.

American Welding Society (AWS D1.1-72) Structural Welding Code, September 1972 with Revisions 1-73 and 2-74.

Det Norske Veritas - Rules for Design, Construction and Inspection of Offshore Structures, 1974.

Det Norske Veritas - Technical Notes for Fixed Offshore Structures.

3. SOIL FOUNDATION

The Norwegian Geotechnical Institute, Oslo, as consultants to the contractors were responsible for the interpretation of soil investigations and geotechnical data. From this information the foundation soil parameters used in platform settlement and geotechnical stability calculations were determined.

4. MATERIALS

Materials to the following specifications were used in platform construction:

(a) Elf Aquitaine Norge - Frigg Field - 1052 No 3-145 Fixed Offshore Structures Materials Specification Rev 4, December 1973.

(b) Elf Aquitaine Norge - Frigg Field - 1052 No 3-155 Fixed Offshore Structures Fabrication Specification Rev 2, February 1974.

ENVIRONMENTAL DESIGN CRITERIA

1. SOIL PROFILE

Tabulated below is the soil profile as defined by samples taken from DP2 location.

Depth Below Seabed (m)	Soil Description
0 to 7	Fine to medium sand, shell fragments
7 to 17	Silty fine to Medium sand, shell fragments silt and clay
17 to 41	Very stiff to hard clay
41 to 47	Silty fine sand, silt pockets
47 to 77	Interbedded silty sand, sandy silt, and clayey silt
77 to 120.5	Fine to medium silt

2. SEABED AND FOUNDATION CONDITIONS

2.1 The platform is piled and no scour protection is fitted. A scouring limit of 2 metres has been set before remedial action to limit scouring will be considered necessary.

END

WIND

		BETWEEN LAT AND +10m	ABOVE +10m (VARIATIONS)
MAXIMUM SUSTAINED WIND (ONE MINUTE)	100 YEAR STORM CONDITIONS	V_{10} = 50m/s	(z IN METRES) $V_z^2 = Ch.V_{10}^2$ $Ch = \frac{z+18}{z-60}$ V_z = VELOCITY AT ELEVATION z; V_{10} = VELOCITY AT ELEVATION 10m
MAXIMUM GUST WIND (THREE SECONDS)	10 YEAR STORM CONDITIONS	62.5m/s	AS ABOVE

RAINFALL

YEARLY AVERAGE	MAX 24 HOUR FALL	YEARLY AVERAGE RAINY DAYS
990mm	86mm	195 DAYS

TEMPERATURE

MAXIMUM SUMMER	MINIMUM WINTER
+32°C	-15°C

BAROMETRIC PRESSURE AT SEA LEVEL

MONTHLY AVERAGE	
DECEMBER 753mm Hg	JUNE 761mm Hg

AMBIENT AIR (SALIFEROUS) - RELATIVE HUMIDITY 79% to 90%

SEA

SURFACE SEA WATER MAXIMUM	SURFACE SEA WATER MINIMUM
17°C	1°C

MAXIMUM TIDE AND STORM ELEVATIONS

STORM AND OPERATING CONDITIONS

1.6m ABOVE LAT

WAVE HEIGHT	
STORM CONDITIONS	DYNAMIC ANALYSIS
29m	17.4m

WAVE FREQUENCY	
STORM CONDITIONS	DYNAMIC ANALYSIS
15s	12s

STORM SURGE
0.6m

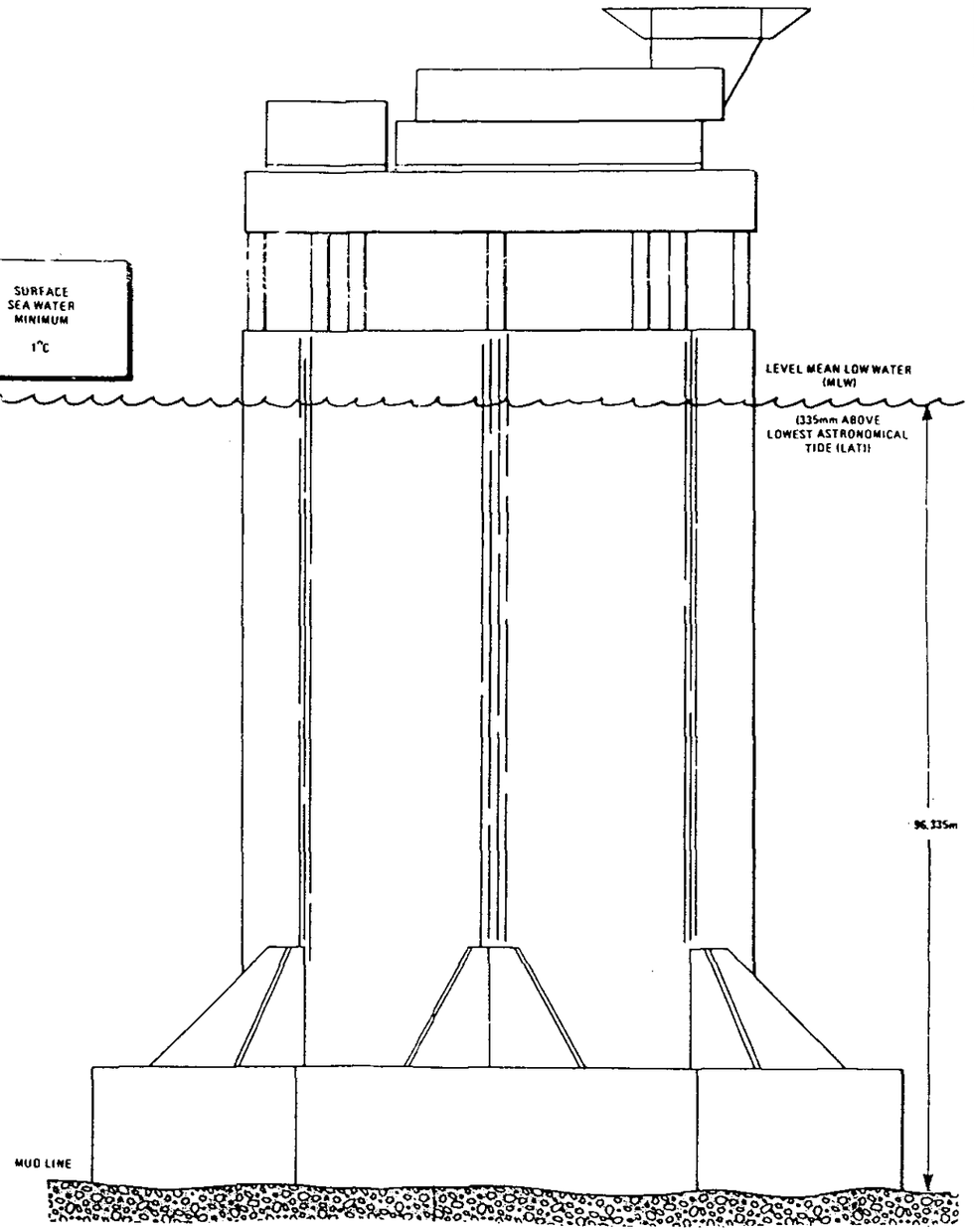
SURFACE CURRENT
STORM CONDITIONS
1.35m/s

LINEAR VARIATION

SEABED +30m CURRENT
STORM CONDITIONS
0.70m/s

LINEAR VARIATION

SEABED CURRENT
STORM CONDITIONS
0.30m/s



ISSUE 3.OCTOBER 1984

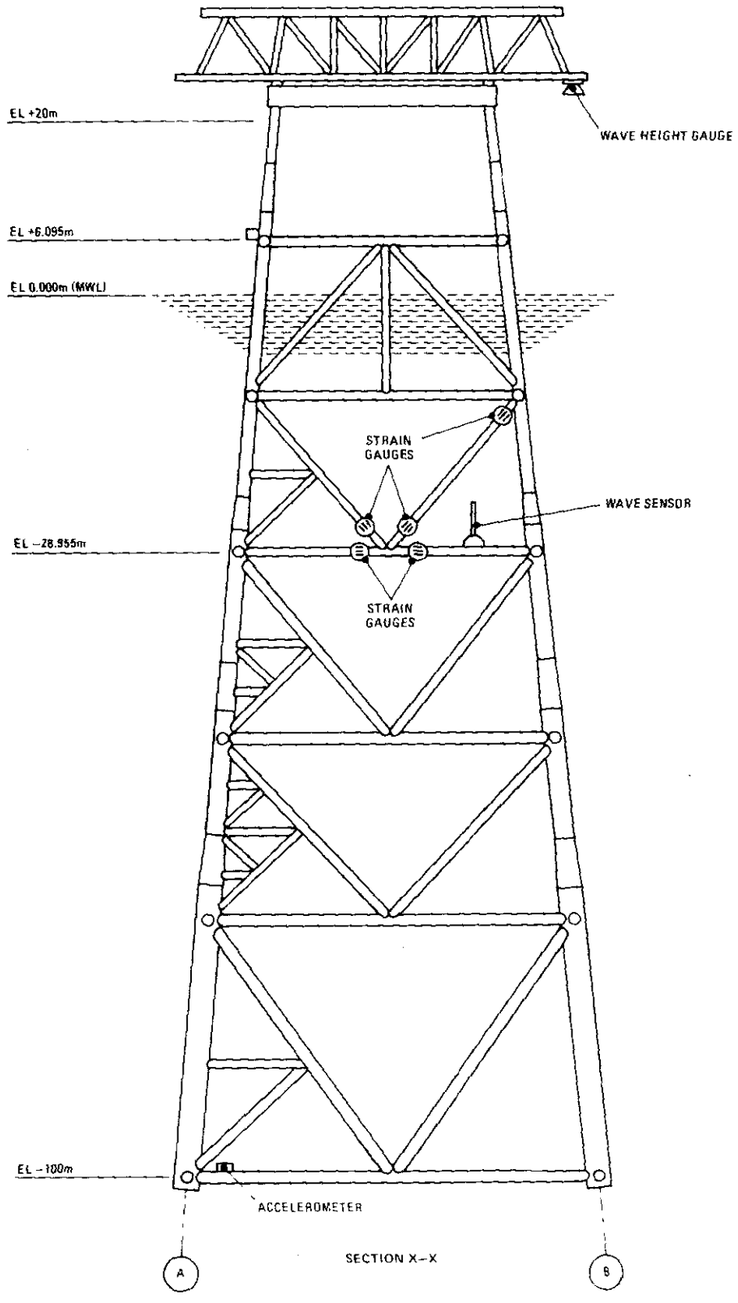
STRUCTURAL INSTRUMENTATION

1. GENERAL

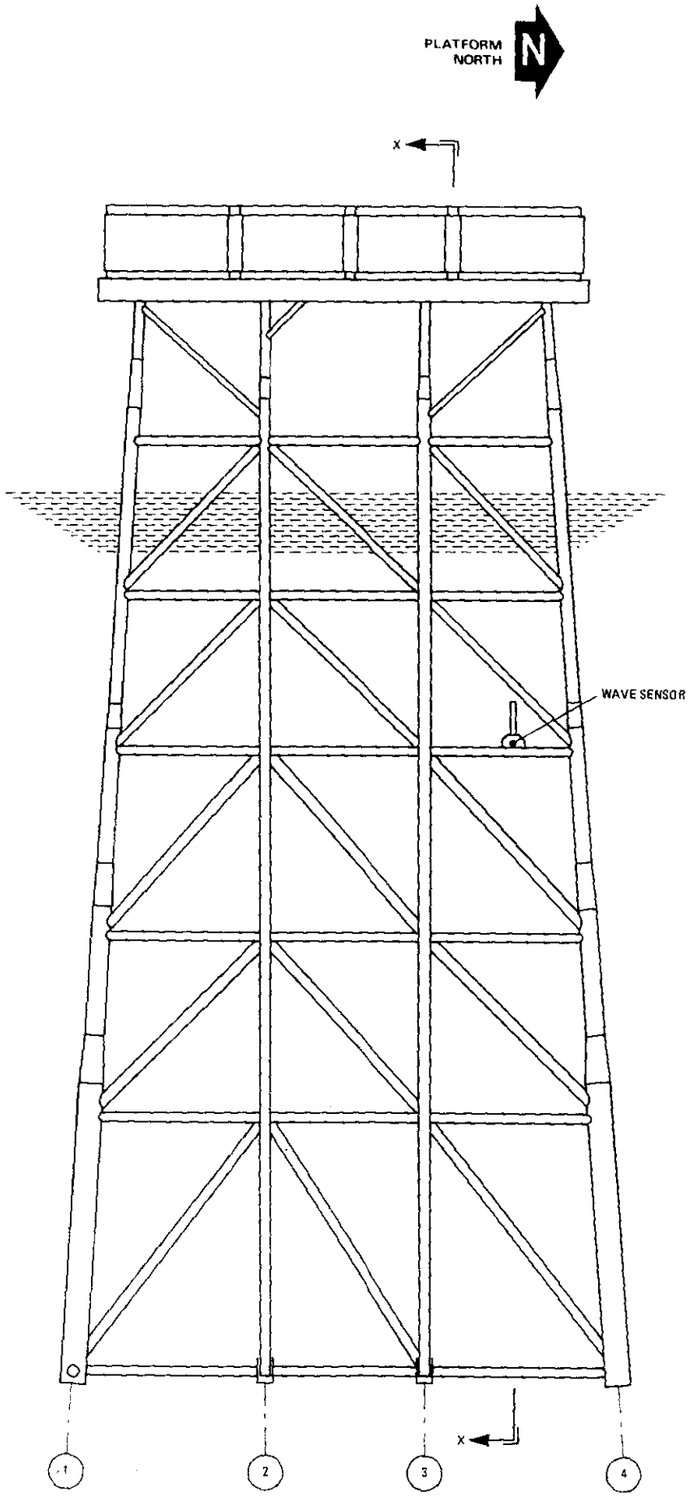
The platform instrumentation measures the sea state and the dynamic response of the jacket structure. The sea state data give the environmental loading on the structure due to waves. They also provide an input for the low cycle fatigue count. The analysis of structure response will show any changes in stiffness and/or mass in structure and/or foundation.

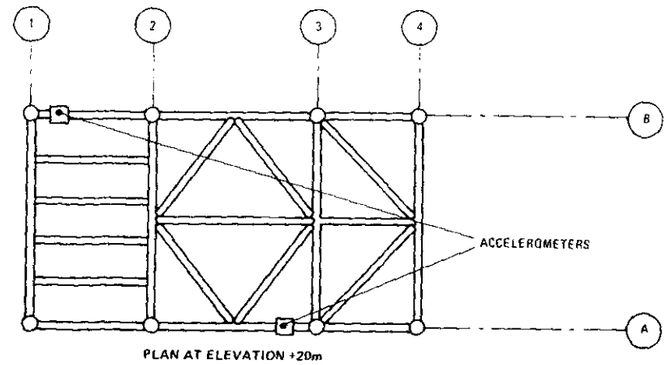
2. STATUS

The instrumentation system was abandoned 1st June 1986 and has later been partly removed.

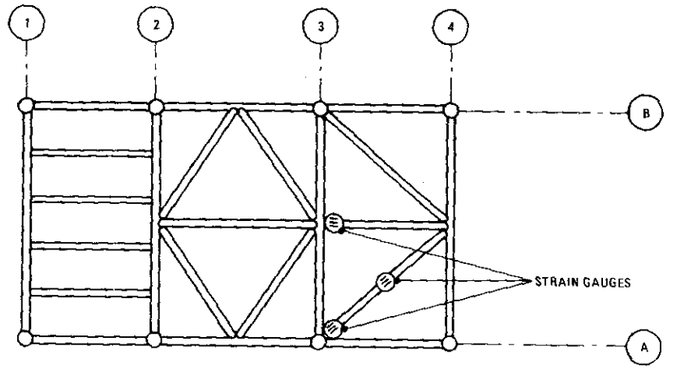


SECTION X–X

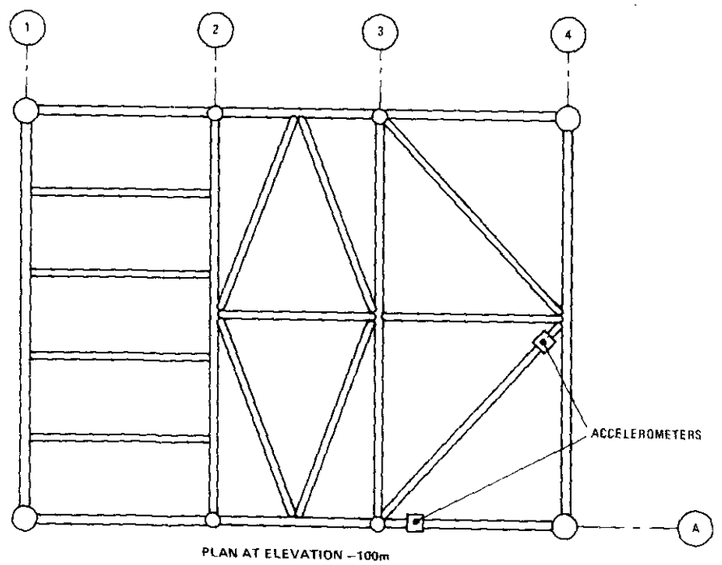




PLAN AT ELEVATION +20m



PLAN AT ELEVATION +6.095m



PLAN AT ELEVATION –100m

ISSUE 1. OCTOBER 1980

STRUCTURAL INSTRUMENTATION	2.3

PRIMARY STRUCTURE

1. GENERAL

The primary structure comprises three main sections, these are:

(a) The jacket - the section between the seabed and elevation +8.23m.

(b) The piling - secures the jacket to the seabed.

(c) The deck support frame - the section which projects from the jacket to elevation +24.4m.

2. JACKET

2.1 The jacket is an eight-legged launch-type structure of tubular construction throughout. It is 106m in height and rectangular in plan. The sides are 48.0m x 25.0m at elevation +8.2m (Level 6) and 61.7m x 43.7m at elevation -100m (level 1). Horizontal triangular bracing separates the legs at levels 1, 2, 3, 4, 5 and 6. Four truss lines, 1, 2, 3 and 4, are formed by a series of 'K' brace members. Outer truss lines A and B are formed by a series of diagonal braces. Conductor guide framing is formed at each level.

2.2 Each corner leg has a diameter of 62in at elevation +6.0m increasing to 72in at elevation -28.9m, 90in at elevation -50.3m and finally 120in at elevation -70.8m. Each of the four intermediate legs has a diameter of 62in. Two additional trusses necessary for launching are formed on the east face of the jacket by additional braces to the intermediate legs. Each of the corner legs is provided with four piling sleeves which extend from elevation -70.86m (Level 2) to elevation -100m (Level 1). Each intermediate leg also forms a piling sleeve for the whole of its length.

2.3 The tubular members below elevation -3.0m are fabricated from high strength steel -10; the tubular members above this elevation are fabricated from high strength steel -20. Special high strength steel -10 is used to fabricate the intersections between the component parts of the tubular members below elevation -3.0m. Special high strength steel -20 is used to fabricate the intersections between the components parts of the tubular members above elevation -3.0m. The conductor guide framing and its bracing at all levels is fabricated from non-structural mild steel. The wall thickness of all tubular members is increased in the splash zone to allow for corrosion.

The conductor guide frame has been re-enforced by installation of mechanical grouted clamps on 12 nodes at el-8.8in (1988).

3. PILING

3.1 The jacket structure is secured to the seabed by 16 primary piles into each of which is placed an insert pile. The primary piles are located in groups of four which are equally spaced on a 16ft. diameter circle described around each corner leg. Four erection piles, one through each of the intermediate legs, are provided for initial location. The primary piles are each of 56in diameter and are 47m long. Each is driven to a depth of 18m and grouted to the pile sleeves.

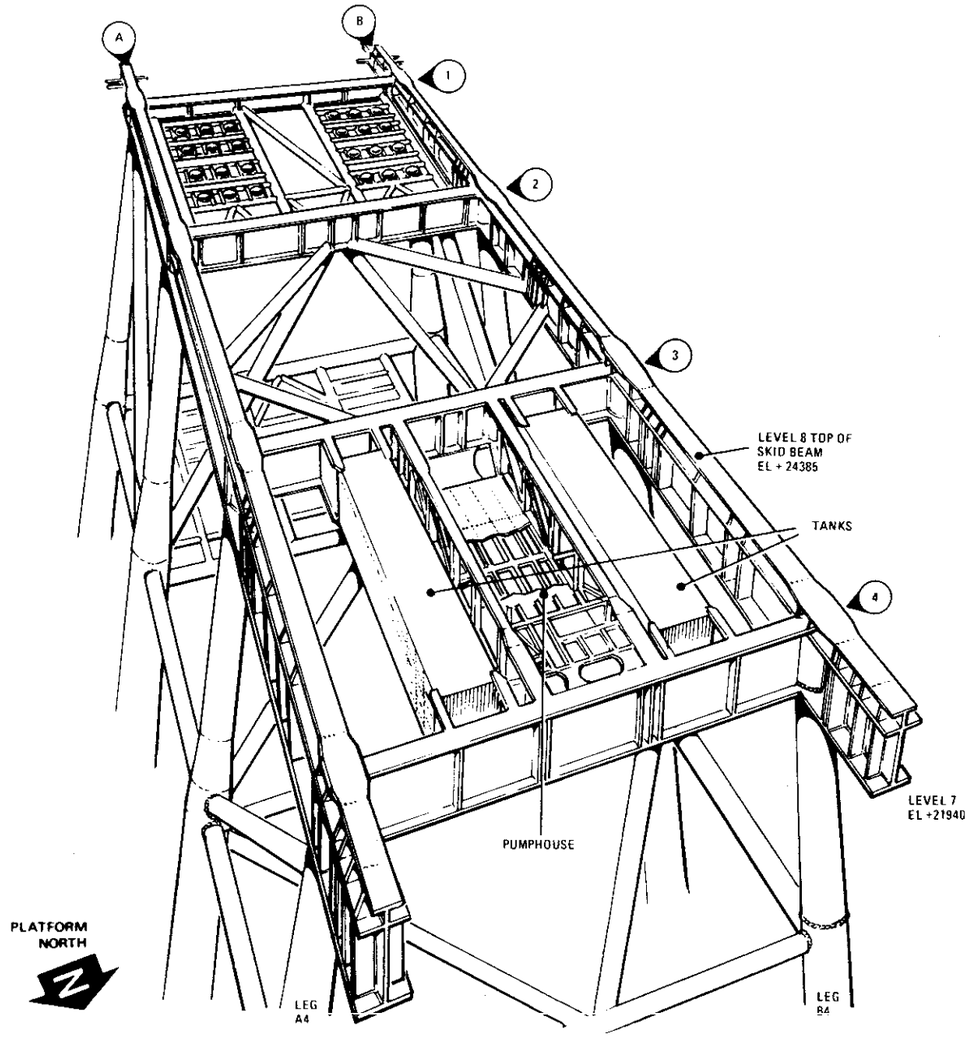
3.2 Insert piles are 146m long and 42in in diameter, tapering to 36in diameter over a length of approximately 22m. The insert piles are placed within the primary piles into a 48in diameter hole which is drilled to a depth of 117m below the mud line. The insert piles are grouted into the drilled holes and the primary piles. The erection piles are 56in in diameter, 109m long, and are driven to a depth of 21m below the mud line and grouted to the intermediate legs.

4. DECK SUPPORT FRAME

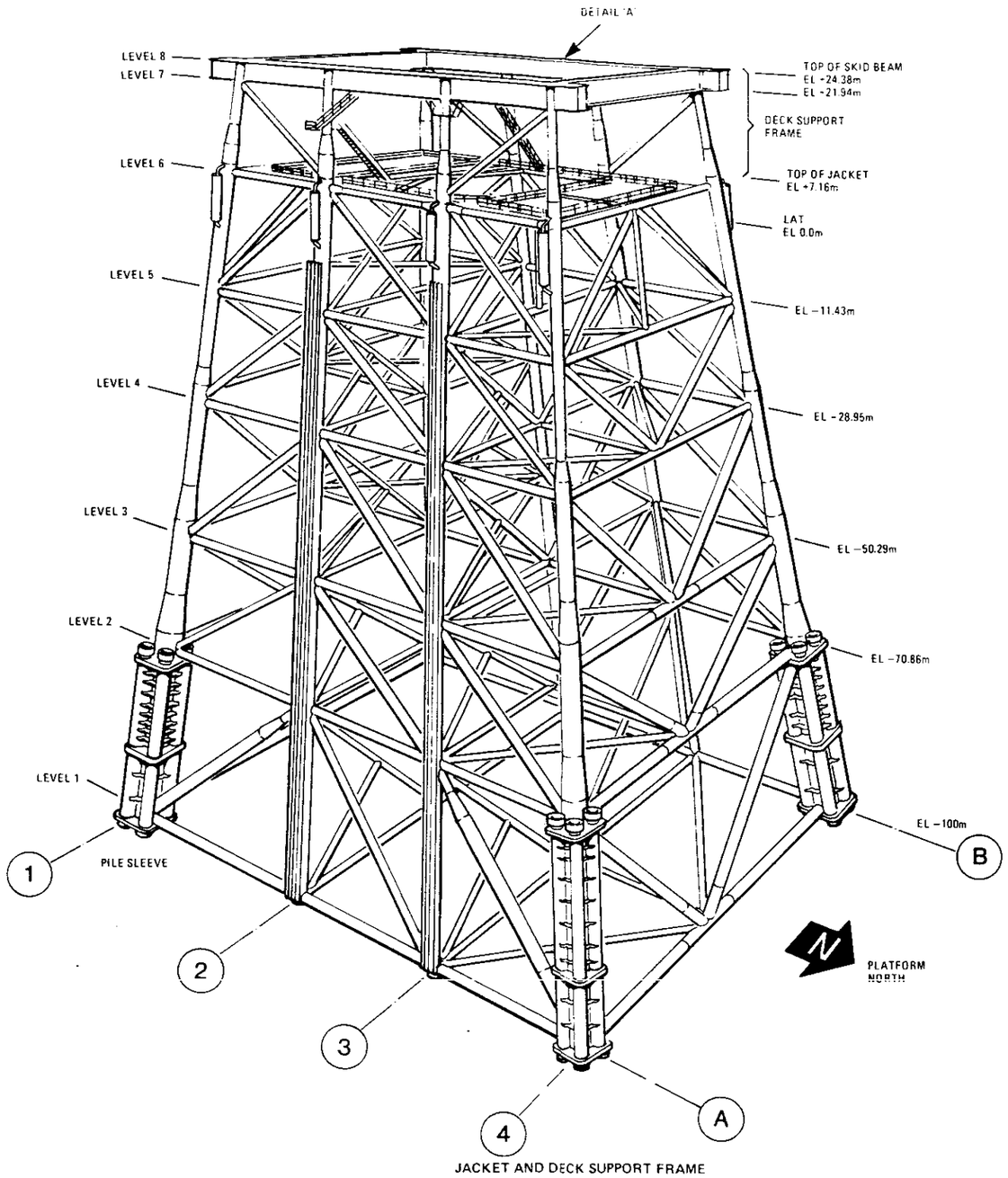
The deck support frame forms a natural continuation of the jacket and extends to elevation +24.385m. Storage tanks and a Pumphouse are located within the deck support frame. These are positioned approximately 3m above the expected maximum wave crest level. The legs and braces of the support frame are of tubular construction and are fabricated from high strength steel -20. The top cord of the support frame comprises a 2.9m deep plate girder on column lines A and B, with a 2.44m deep plate girder on lines 1, 2, 3 and 4. The 2.9m girder includes a skid beam on its top surface. The intersections between the upper ends of the legs and the plate girders are fabricated from special high strength steel -20.

5. MINOR STRUCTURES

Access to the deck support frame from Level 6 is by stairways located on the east and west sides of the jacket. A walkway is also provided around three outer sides of the deck supports frame on columns A and B and column 1. The jacket legs are protected by large bumpers.



DETAIL 'A' DECK SUPPORT FRAME



JACKET AND DECK SUPPORT FRAME

SECONDARY STRUCTURE

1. GENERAL

1.1 The deck structure comprises four prefabricated modules mounted on top of the support frame at elevation +25.225m. Production equipment is located in Modules 1 to 3, with utility equipment and Living Quarters located in Module 4. The Drilling Rig is mounted on top of Module A.

1.2 The module decks are supported by two main transverse trusses per module (total of eight trusses), extending beyond jacket column line A and jacket column line B and supported on jacket Level 8. The trusses are fabricated from structural shapes. Secondary deck beams transmit loads to deck girders which in turn transmit loads to the nodes of the trusses.

2. DESCRIPTION

2.1 Module 1

2.1.1 This is located at the south end of the platform and is a steel girder structure 22.45m wide, 13.715m deep and 7.375 high. It is clad on the three exposed sides with corrugated stainless steel sheeting and is separated from Module 2 by a fireproof partition wall.

2.2.2 The module contains 24 wellheads, grouped in two equal clusters with a fireproof partition wall between the clusters. Also located in the module are test and start-up separator FA204, pig trap PA 201 and the hydraulic power packages for the wellhead and downhole valves.

2.2 Module 2

Located north of Module 1, this module is of similar construction and size. It houses 24 bypassed scrubber desanders and the hydraulic power unit for the choke control valves. Both exposed sides are clad in corrugated stainless steel sheeting.

2.3 Module 3

2.3.1 This module contains the production manifold and flow control valves, two 26in pig traps, liquid separators and methanol gas contactors, and the 4in condensate pig trap.

2.3.2 Rolling doors are provided at each end of the module to enable equipment to be transferred between the module and the work areas outside. The north wall of the module is fireproof to afford protection to the adjacent Living Quarters Module.

2.3.3 The module is 32.92m wide, 10.365m deep and 7.375m high. Construction is similar to the other production modules. Two cranes are mounted on pedestals located at the south-west and south-east corners of the module. An overhead travelling crane is installed inside the module for lifting equipment within the module.

2.4 Module 4

2.4.1 Module 4 is the same size as Module 1, and is located at the north end of the platform. It is divided into two levels; the floor of the second level is at elevation +28.597m.

2.4.2 The wall facing Module 3 is of insulated steel plate construction to form a fire barrier. The remaining walls are clad in corrugated stainless steel sheeting. Interior partions are constructed of fireproof materials of the appropriate rating, and are acoustically and/or thermally insulated as required.

2.4.3 The module is subdivided into compartments as follows:

(a) First Level

(i) Substation - containing a 1000 kVA power transformer and associated equipment.

(ii) Electrical workshop - small workshop/document area for the electricians.

(iii) Auxiliary Generator Room - containing a 625 kVA diesel generator and associated equipment.

(iv) Instrument Room - with tools and equipment for instrument and mechanical maintenance. This room also houses cathodic protection and oceanographic instrumentation cabinets.

(v) Fire Pump Rooms - two adjacent rooms housing firewater pumps and associated equipment.

(vi) Air Conditioning Rooms - containing two air conditioning units, one for the Living Quarters and the other for the Technical Rooms.

(vii) Showers and Toilets.

(b) Second Level

(i) Motor Control Centre (MCC) - containing 380/220V switchgear, a control panel for the auxiliary generator and power distribution cabinets.

(ii) Battery Room - containing 48V emergency supply batteries, battery charger and 48V distribution cabinets.

(iii) Control Room - containing remote control and information panels for the process system, together with safety annunicator panels.

(iv) Telemetry Room - this houses process transmitting equipment and the central telephone and public address equipment.

(v) Living Quarters - comprising four 2-man cabins, a Coffee Room, a Recreation Room, a First Aid Room, Toilets and Showers.

(vi) The Upper Level of the Pump Room - containing an overhead travelling crane to lift the firewater pumps. Access to the lower level is via removable hatches in the floor.

2.4.4 Burner booms are attached to the deck of Module 1 on the east and west sides of the module.

3. DECK LOADING PLAN

3.1 Definition

(a) Dead Load — this is the weight of the structure inclusive of cladding etc. in the modules and the dry weight of equipment known to be inside the structure.

(b) Variable Load — this is the variable part of the equipment inside and includes mud, cement, bentarnite, barite, water, oil, etc., inside the equipment.

(c) Live Load — the live load on the structure includes allowances for changes in equipment or extra loads imposed by ice, snow, water, people, moving machinery, etc. Tubular equipment, sack storage, dynamic pull from the derrick and other drilling equipment are considered as live loads.

3.2 Drilling Package

MODULE	DEAD LOAD KN	VARIABLE LOAD KN	LIVE LOAD* KN
01	1916	-	687
02	1761	1952	2070
03	1601	643	216
04	2830	78	255
05	804	-	-
06	3541	-	2021
07	669	-	3434
08	5611	-	1884
09	-	-	100
10	765	3100	-
11	-	-	100
12	490	2256	-
13	157	627	-
TOTAL DRILLING PACKAGE	20145	8656	10767

* Total weight does not include all the drilling equipment some of which is not on the platform at this time.
Therefore the real total live load will be about 2500-3000 KN and the variable load will not reach maximum.

3.3 Modules 1, 2, 3 and 4

(a) Module 1

Loading 1	Dead load	3613 KN
Loading 2	Imposed load (celler deck)	1530 KN
Loading 3	Reactions from flare booms	178 KN
	Total	5321 KN

(b) Module 2

Loading 1	Dead load	2318 KN
Loading 2	Imposed loads (celler deck)	2949 KN
	Total	5267 KN

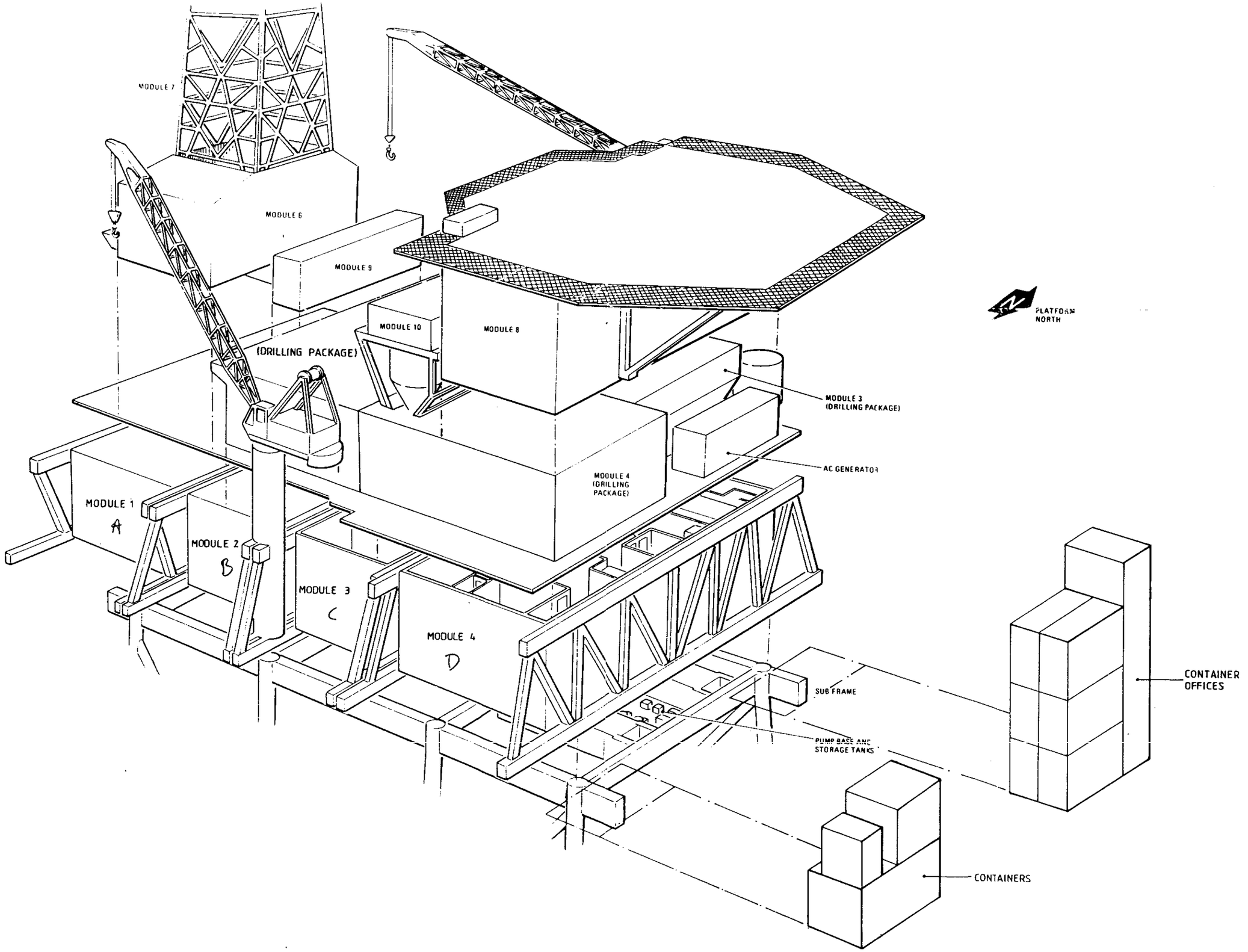
(c) **Module 3**

Loading 1	Dead load	2996 KN
Loading 2	Imposed loads (celler deck)	4797 KN
Loading 3	Crane	649 KN
	Total	8438 KN

(d) **Module 4**

Loading 1	Dead load (main structure)	3463 KN
Loading 2	Dead load 2	2408 KN
Loading 3	Imposed loads	2572 KN
	Total	9443 KN

Total Load 1 + 2 + 3 + 4 = 28.47×10^3 KN



ISSUE 2, OCTOBER 1984

SECONDARY STRUCTURE	2.5

RISERS AND FLOWLINES

1. GENERAL

1.1 A number of risers are used to connect platform systems to sea lines laid on the seabed. These risers are:

(a) Compressed air R2 - 26 in diameter.

(b) Methanolated water riser J1 - 4.1/2in diameter.

(c) Gas production riser R3 - 26in diameter.

(d) Nitrogen storage riser J2 - 8.5/8in diameter.

(e) Two electrical risers - each 8.5/8in diameter.

1.2 R2 and J1 are located on jacket leg B3. R3 and J2 are located on jacket leg B2. One electrical riser is located on jacket leg B2, the other is located on jacket leg B3.

1.3 The risers are secured to the jacket legs by a number of clamps of various types as follows:

(a) Anchor clamp - does not permit movement of the riser in any direction.

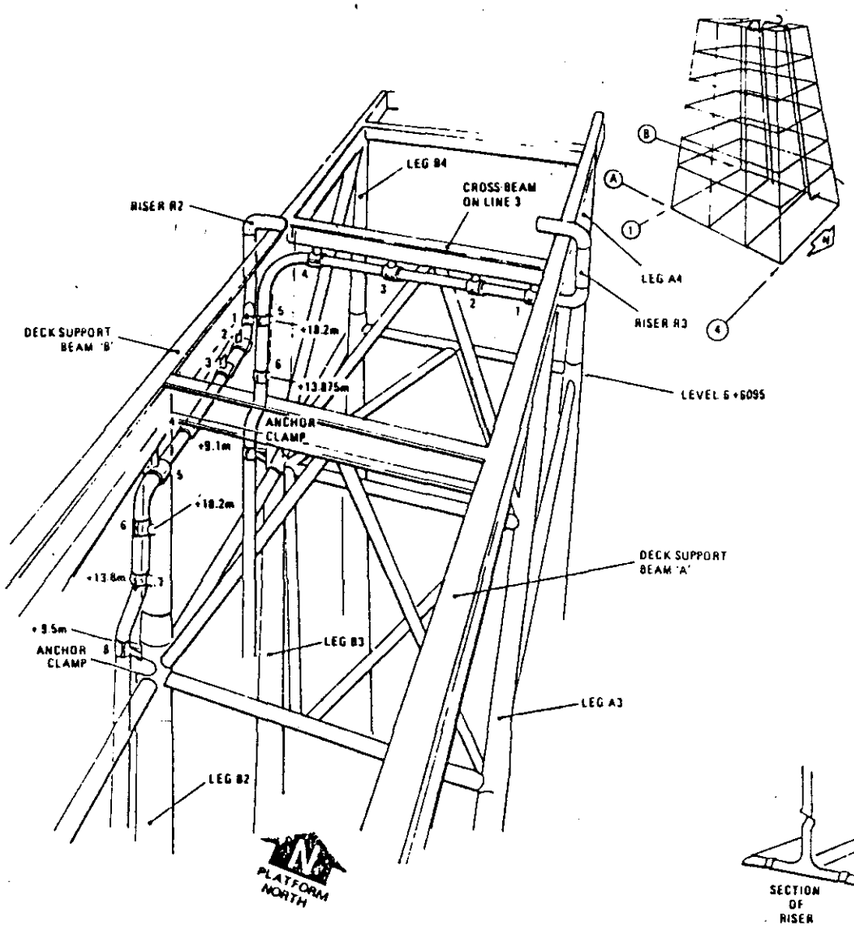
(b) Clamp - permits movement of the riser in one direction (axial).

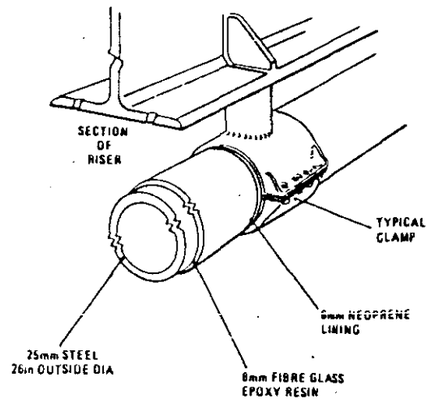
(c) Guide - embraces the riser but permits limited movement in any direction.

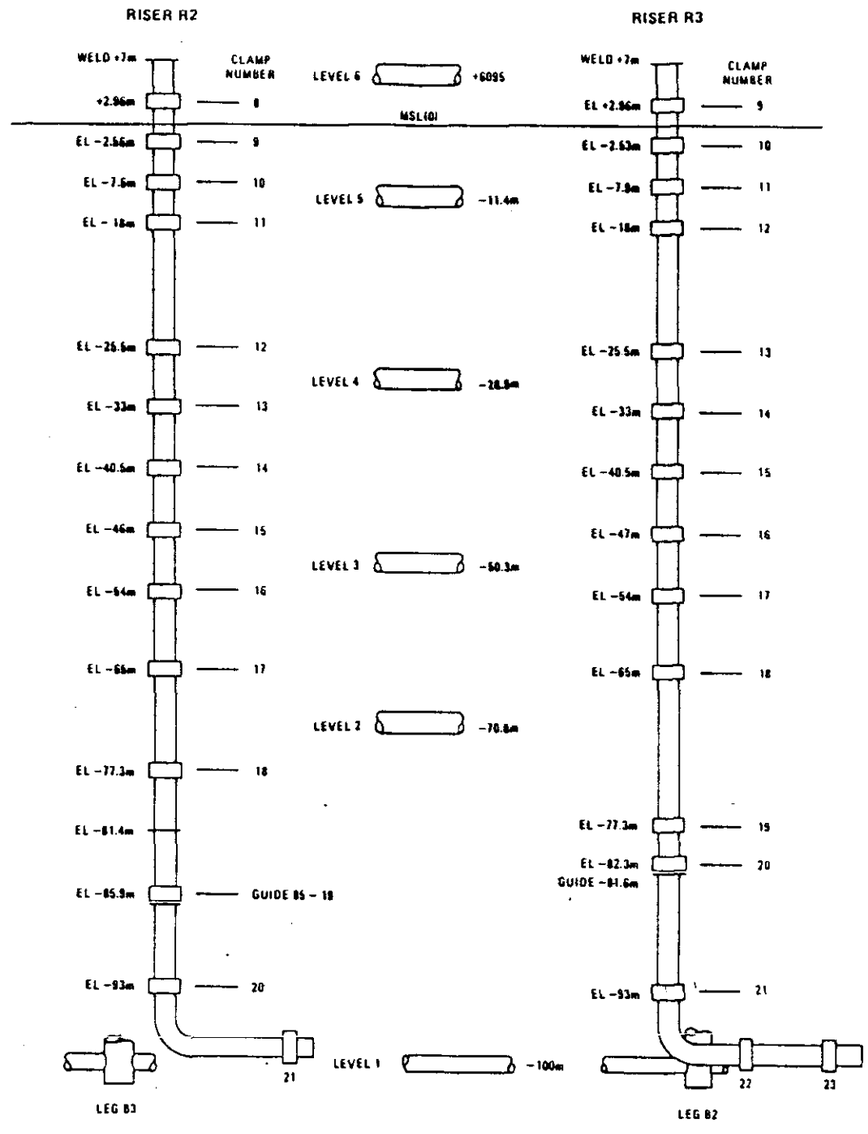
1.4 Details of the risers are given in the following table:

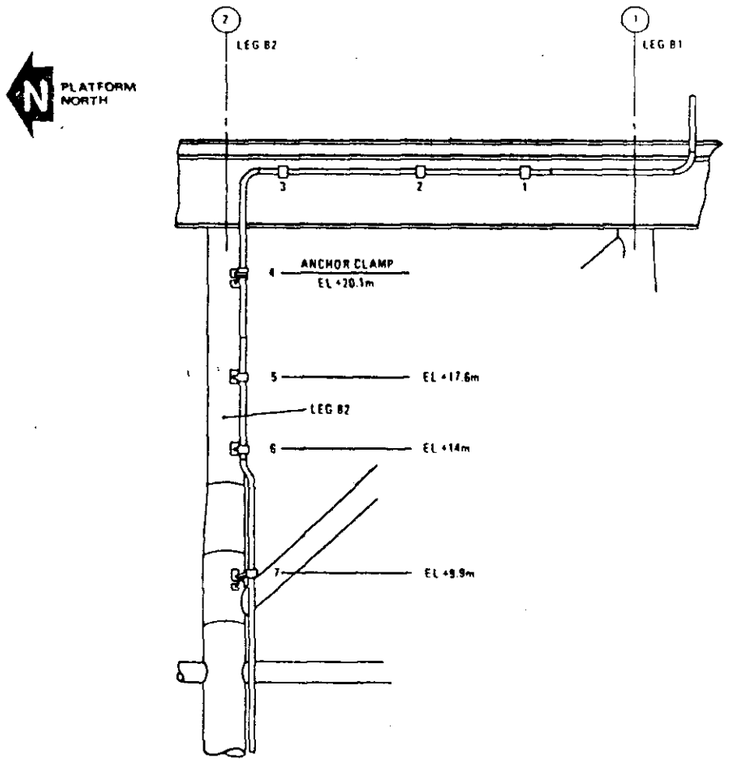
Data	26"	8.5/8"	4,5"
Designation	R3, R2	J2	J1
Outside dia (in)	26	8.5/8	4.1/2
Wall thickness (in)	1.00	0.625	0.531
Grade	x 60	x 60	x 60
Process of Manufacture	Submerged arc welded	Seamless	Seamless
Corrosion coating	Glass fibre epoxy resin	Glass fibre epoxy resin	Glass fibre epoxy resin
Coating thickness (mm)	8	8	8
Flanges at bottom	No	Yes	Yes
Operating pressure (psi)	2500	5000	2500
Operating temperature ^{o}F ^{o}C	104 40	60 16	104 40

The two 26in risers R2 and R3 are fitted with a movement measuring device. Graduated rules are clamped to one side of the protection sleeve of the riser and resting on the other side of the guide clamp. The rules are positioned in the axes of the respective pipelines thereby enabling movement along these axes only to be monitored.

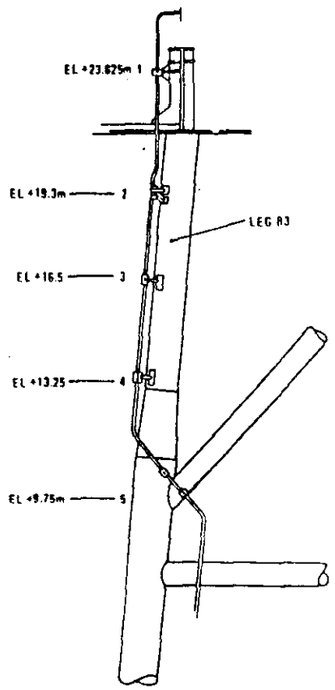

RISER R2
LEG B4
CROSS BEAM ON LINE 3
LEG A4
RISER R3
DECK SUPPORT BEAM 'B'
+18.2m
+13.875m
LEVEL 6 +6095
ANCHOR CLAMP
+9.1m
+18.2m
+13.8m
DECK SUPPORT BEAM 'A'
+9.5m
ANCHOR CLAMP
LEG B3
LEG A3
LEG B2
PLATFORM NORTH


SECTION OF RISER
TYPICAL CLAMP
6mm NEOPRENE LINING
25mm STEEL 26in OUTSIDE DIA
8mm FIBRE GLASS EPOXY RESIN

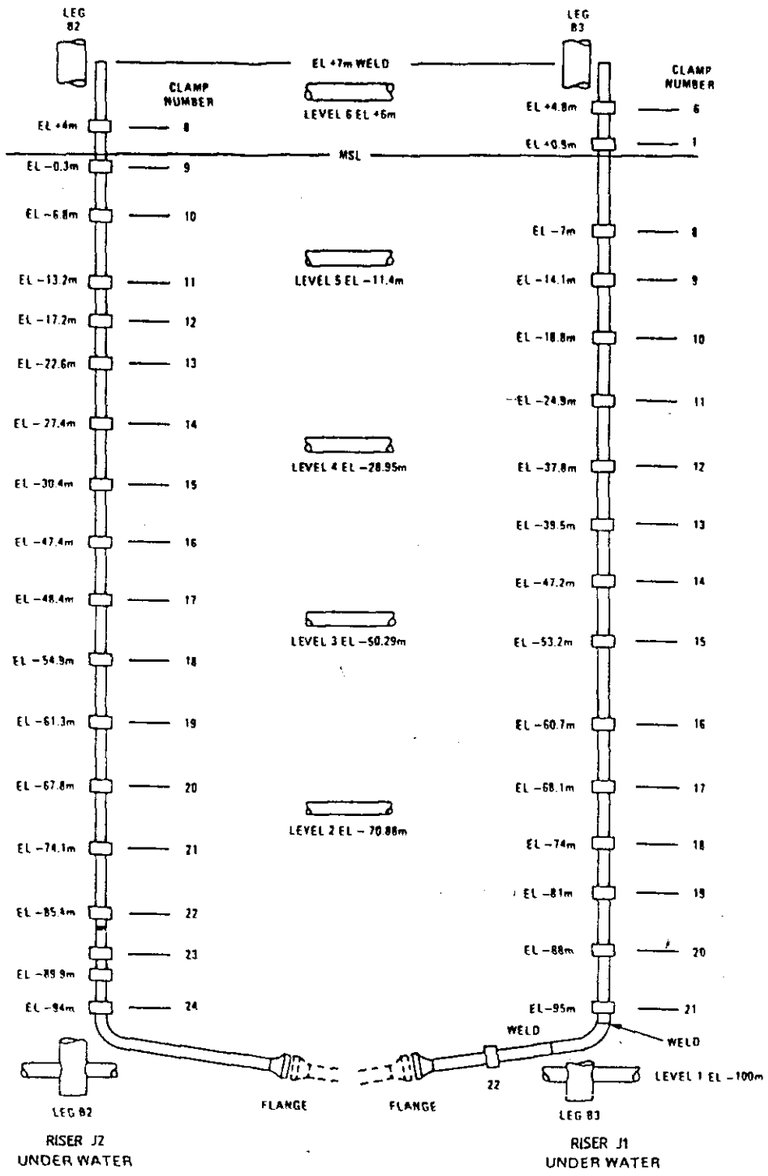

RISER R2
WELD +7m
CLAMP NUMBER
+2.96m
8
EL -2.56m
9
EL -7.6m
10
EL -18m
11
EL -25.6m
12
EL -33m
13
EL -40.5m
14
EL -46m
15
EL -64m
16
EL -66m
17
EL -77.3m
18
EL -81.4m
EL -85.9m
GUIDE B5 - 18
EL -93m
20
21
LEG B3
LEVEL 6
+6095
MSL(0)
LEVEL 5
-11.4m
LEVEL 4
-28.8m
LEVEL 3
-50.3m
LEVEL 2
-70.8m
LEVEL 1
-100m
RISER R3
WELD +7m
CLAMP NUMBER
EL +2.96m
9
EL -2.63m
10
EL -7.9m
11
EL -18m
12
EL -25.5m
13
EL -33m
14
EL -40.5m
15
EL -47m
16
EL -54m
17
EL -65m
18
EL -77.3m
19
EL -82.3m
20
GUIDE -84.6m
EL -93m
21
22
23
LEG B2



RISER J2
(LOOKING EAST ABOVE WATER)

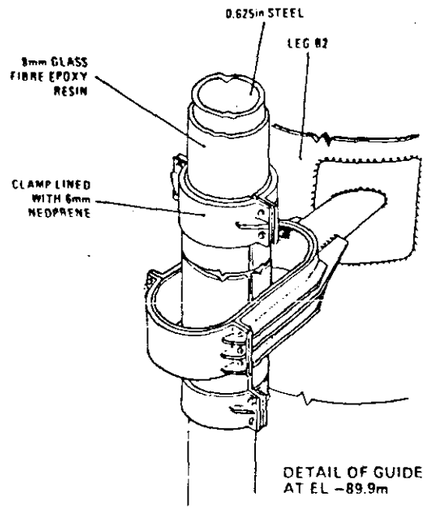


RISER J1
(LOOKING NORTH ABOVE WATER)



RISER J2
UNDER WATER

RISER J1
UNDER WATER



DETAIL OF GUIDE
AT EL −89.9m

ISSUE 2, AUG. 1991

RISERS AND FLOWLINES Risers J1 and J2	2.6.2

MATERIALS AND CONSTRUCTION

1. GENERAL

1.1 The platform is divided into two parts - the jacket (primary) structure and the deck (secondary structure).

1.2 The jacket extends from the seabed to the top of the deck skid beams at elevation +24.385m. The deck structure mounted on the deck skid beams extends to the top of the Drilling Package skid beams at elevation +32.79m.

2. CONTRACTORS

2.1 The platform was designed by McDermott-Hudson Engineering, London.

2.2 The jacket was fabricated by Union Industrielle et d'Entreprise, Cherbourg, France.

2.3 The deck structure was fabricated by Union Industrielle et d'Entreprise, St Wandrille, France.

3. DESIGN CODES

The platform complies with the following codes and regulations :

American Institute of Steel construction - Manual of Steel Construction. Seventh Edition 1973.

American Petroleum Institute - API RP2A - API Recommended Practice for Planning Designing and Constructing Fixed Offshore Platforms. Sixth Edition 1975 and 7th Edition 1976.

American Petroleum Institute - API Specification 2C - Offshore Cranes.

American Petroleum Institute - API Specification 6A - Wellhead Equipment.

American Petroleum Institute - RP500A and B - Area Classification.

American Petroleum Institute - API - RP520 - Design and Installation of Pressure Relieving Systems

American Petroleum Institute - API RP521 - Design for Pressure Relief and Depressurising Systems.

American Petroleum Institute - API - 1104 - Standard for Welding Pipelines and Related Facilities.

American National Standards Institute - A17.1 - Elevators.

American National Standards Institute - ANSI - B31.3 Petroleum Refinery Piping.

American National Standards Institute - ANSI - B31.4 Liquid Petroleum Transportation Piping.

American National Standards Institute - ANSI - B31.8 Gas Transmission and Distribution Systems.

American Society of Mechanical Engineers - ASME Section VIII and IX - Boiler and Pressure Vessel Code.

American Society for Testing and Materials Specification - Division 1.

American Society for Testing and Materials/American Welding Society - Joint Specification for Welding Electrodes.

American Welding Society.

British Standards Institution - BS229 - Flameproof Enclosure of Electrical Apparatus.

British Standards Institution - BS1515 - Part 1 - Carbon and Ferritic Steels.

British Standards Institution - BS2573 - Permissible Stresses in Cranes.

British Standards Institution - BS4137 - Selection of Electrical Equipment for Division 2 Area British Standard Code of Practice.

British Standards Institution - BS4683 - Specification for Electrical Apparatus for Explosive Atmospheres.

British Standards Institution - Code of Safe Practice CP326 - The Protection of Structures Against Lightning 1948.

British Standards Institution - Code of Safe Practice CP1003 - Electrical Apparatus and Associated Equipment for use in Explosive Atmospheres of Gas or Vapour Other Than Mining Applications.

British Standards Institution - Code of Safe Practice CP1013 - Earthing.

Det Norske Veritas - Rules for Design, Construction and Inspection of Offshore Structures 1974.

Det Norske Veritas - Rules for Fixed Offshore Structures.

Elf Aquitaine Norge - Frigg Field - 1052 No 3 - 145. Fixed Offshore Structures Materials Specification Rev 4, December 1973.

Elf DP2 Certification Technical Documentation - Part XIX. Cathodic Protection - 19 September 1977.

Elf Norge - Frigg Field - 1052 No 3 -169 - Painting for Steel Structures Rev. 1 March 1974.

Elf Aquitaine Norge - Frigg Field - 1052 No 3-155 - Fabrication Specification Rev 2/JPS, February 1974.

Elf Norge - Frigg Field - 1052 No 5-498 - Coating Systems for Steel Structures of Phase II Rev 1, October 1975.

Elf - RE Equipment - Standard Specification SG P07 (SNEA(P) Specification No. RG1350026) Coating for Marine Structures Rev 0, September 1972.

International Electrotechnical Commission - IEC 79 - Electrical Apparatus for Explosive Gas Atmospheres.

Institution of Electrical Engineers (IEE Regulations)

Illuminating Engineering Society Code (IES Code)

Institute of Petroleum Code - Model Code of Safe Practice : Part 1 Electrical and Part 8 Drilling and Production in Marine Areas.

National Electrical Manufacturers Association (NEMA).

U.S. National Electric Code (NEC).

Union Technique de l'Electricite (UTE).

4. MATERIALS

4.1 The jacket and main deck structure were constructed from high strength and mild steels (see Table 2.7)

4.2 Steel quality designations:

(a) HS10(20) ≈ High strength with impact testing temperature -10°C (-20°C)

(b) SHS10(20) ≈ Special high strength with impact testing temperature -10°C (-20°C)

(c) ML10(0) ≈ Mild steel with impact testing temperature -10°C (0)

5. PAINTS AND COATINGS

5.1 All surface preparation and coating on the platform complies with the following codes:

Swedish Standards SIS.05.5900 - Pictorial Surface Preparation Standards for Painting Steel Surfaces 1967.

SSPC Surface Preparation Specification - VIS1.

British Standards Institution - BS 4232 Surface Finish of Blast Cleaned Steel for Painting 1967.

European Scale of Degree of Rusting for Anti-corrosive Paints. Stockholm 1961.

Elf - RE Standard Specification P7 - Coating for Marine Structures Rev 1, March 1975.

Elf Norge -Frigg Field Painting Specification for Steel Structures DEP1052, No 3 - 169 Rev 1, March 1974.

American Society for Testing and Materials - ASTM A123 Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed or Forged Steel Shapes, Plates, Bars and Strips.

American Society for Testing and Materials - ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware.

American Society for Testing and Materials - ASTM A143 Safeguarding Against Embrittlement of Hot Galvanized structural Steel Products.

5.2 External surfaces in the tidal range and splash zone are coated with antifouling paint as follows:

1 coat primer	- 75 microns
3 tie coats	- 1 x 25 microns, 2 x 100 microns
2 coats antifouling	- 40 microns each

5.3 External surfaces in the emerged zones (decks, bridges etc) are painted pearl grey (Signalec colour code No GR4) as follows:

1 coat primer	- 75 microns
2 tie coats	- 25 and 100 microns
1 finishing coat	- 50 microns

5.4 High temperature surfaces (+110°C to +400°C) are painted silver as follows :

1 coat primer	- 50 microns
2 tie coats	- 25 microns each
2 finishing coats	- 25 microns each

5.5 Non-skid surfaces are painted pearl grey (Signalec colour code No GR4) as follows:

1 coat primer	- 75 microns
2 tie coats	- 100 microns each
1 finishing coat	- 75 microns

Before the second tie coat dries, internal surfaces are sprinkled with 0.1mm to 0.5mm inert grit; external surfaces are sprinkled with 0.5mm to 2mm inert grit.

5.6 Galvanised surfaces are etched and degreased and painted in accordance with the above specifications.

6. PIPELINE IDENTIFICATION SYSTEM

Pipeline systems are identified by coloured arrows superimposed on coloured bands located at convenient intervals. Flow direction is indicated by the arrows which also have the pipeline contents stencilled on them in black letters.

TABLE 2.7 JACKET AND MAIN DECK STRUCTURE MATERIALS

Designation	Steel Grade (DIN 17 100)	Typical Application
HS10	St 52-3N	Jacket braces and piles below elevation -3m
HS20	St 52-3N	Jacket and deck members and main module beams above elevation -3m
SHS10	St 52-3N	Can sections and overlapped and heavy wall stubs below elevation -3m
SHS20	St 52-3N	Can sections and overlapped and heavy wall stubs above elevation -3m
ML10	St 37-3U	Conductor frame members below elevation -3m and module beams
ML20	St 37-3N	Conductor frame members above elevation -3m

ELF NORGE A/S
PIPELINE IDENTIFICATION COLOUR CODE
FRIGG FIELD

COLOUR CODE	PIPE CONTENT	COLOUR CODE	PIPE CONTENT
	SEA WATER		METHANOL
	FRESH WATER		GLYCOL
	FIREWATER		INHIBITOR
	SEWAGE AND DRAIN		CHEMICALS
	DIESEL OIL		CO_2 AND HALON
	LUB OIL		WET GAS
	HYDRAULIC OIL		DRY GAS
	CONDENSATE		HP RELIEF GAS
	STEAM		LP RELIEF GAS
	COMPRESSED AIR		FUEL GAS
	INSTRUMENT AIR		HP MUD
	VENTILATION PRESSURISATION AND AIR CONDITIONING		LP MUD

CATHODIC PROTECTION

1. GENERAL

1.1 To prevent corrosion, sacrificial anodes are located at strategic points around the jacket structure. The sacrificial anodes will corrode more readily than the jacket structure, thus affording protection.

1.2 The design criteria for the jacket cathodic protection system is as follows:

(a)	Design life	20 years
(b)	Current density for bare steel in sea water	130 mA/m^2
(c)	Current density for bare steel in mud	20mA/m^2
(d)	Current density for coated steel in the splash zone	50mA/m^2
(e)	Aluminium anodes of type ALAP of Nakagawa with material composition	3.24 ± 0.3% Zn 1.8 ± 0.2% Mg 0.02 ± 0.8% In 0.007 ± 0.003% Sn Remainder A1

Efficiency greater than 80 per cent or greater than 2.391 Ah/kg.

1.3 Potential measurements carried out during the inspection period 1978-79 showed that the main legs, guide frames and conductor pipes were under protected. Additional bracelet mounted anodes were therefore added in 1980-81.

2. DESCRIPTION

2.1 Various parts of the primary structure and risers (cathodes) and the sacrificial anodes are permanently connected by bonding, which creates low resistance paths under all service conditions.

2.2 On jacket surfaces, bar anodes of various weights are used. The 'cast-in' steel cores of the bar anodes are welded to the jacket structure.

2.3 On risers, bracelet type zinc anodes, made up in halves, are clamped into position. The 'cast-in' steel cores are welded to the riser structure.

2.4 Flat block type zinc anodes of various weights are welded to the riser clamps.

3. ANODE DETAILS

3.1 Details of sacrificial anodes on the jacket are tabulated in Table 2.8.1.

3.2 Details of sacrificial bracelet type anodes on the risers are tabulated in Table 2.8.2

3.3 The permanent riser supports were fitted with zinc anodes (according to Solus Schall report No S03992 dated 15 September 1975) as follows:

(a) Four 10.2 kg anodes plus two 5.5 kg anodes on each of the twenty six 26in riser supports.

(b) Three 3.5 kg anodes on each of the seventeen 8.5/8in riser supports.

(c) Five 1.0 kg anodes on each of seventeen 4.1/2in riser supports

Anodes of 0.5 and 1.0 kg were installed on the temporary supports and braces.

3.4 Details of the additional bracelet anodes are given in Table 2.8.3

TABLE 2.8.1 ANODE REQUIREMENT AND PROVISION

Item	Elevation (m)	Jacket Area (m^2)	Conductor Pipe Area (m^2)	Total Area (m^2)	Current Density (mA/m^2)	Intensity (Amps)	Anodes (qty and weight)
Splash zone	-4 to +3	416.0	348.6	764.0	50/130	66.04	-
Inter-level	-11.3 to-4	989.0	368.1	1278.6	130	166.1	-
Level 5	-11.3	1119.7		1119.7	130	146.6	100-385 kg
Inter-level		2615.0		3483.0	130	452.9	76-385 kg
Level 4	-28.29	1262.4		1262.4	130	164.1	48-385 kg
Inter-level		2953.4	1044.6	4085.0	130	5.4	105-385 kg
Level 3	-50.29	1585.2			130	195.7	56-385 kg
Inter-level		4394.3	1019.5	5403.0	130	703.8	106-385 kg
Level 2	-70.86	1653.0		1653.0	130	214.9	97-385 kg
Inter-level		7120.0	1484.6	8604.0	130	1113.6	160-385 kg 140-385 kg
Level 1	-100	2047.0		2047.0	130	266.11	87-265 kg
Wells	-100 to -500				20	296.5	-
Piles					20	209.5 6.5	-
TOTAL						**4527.0**	**882-385 kg 87-265 kg or 4560 Amp**

TABLE 2.8.2 SACRIFICIAL BRACELET TYPE ANODES

Riser	Anode Locations on Risers (elevation in metres)					Zinc Weight per Anode (kg)
R3 26in	-1.50	-21.75	-36.75	-59.50	-78.29	min 3 from elbow on bottom	227
R2 26in	-1.50	-21.75	-36.75	-59.50	-78.29	min 3 from elbow on bottom	227
J2-8.5/8in	-3.55	-19.91	-37.96	-58.14	-78.29	min 3 from elbow on bottom	68
J1-4.1/2in	3.55	-21.79	-39.74	-59.24	-80.24	min 3 from elbow on bottom	34

TABLE 2.8.3 ADDITIONAL SACRIFICIAL BRACELET TYPE ANODES

Area	Elevation	Type	Location	Number	Weight
1st	-71m	1	Insert piles. A/B	9	450 kg
		5	Pile followers. A/B	5	450 kg
		6	Main piles. B	2	450 kg
2nd	-50m	2	Main leg below node	4	1000 kg
		3	Main leg above node	4	500 kg
3rd	-30m	4	Conductors	5	340 kg
	-40m	4	Conductors	10	340 kg
	-50m	4	Conductors	20	340 kg
	-65m	4	Conductors	10	340 kg
	-71m	4	Conductors	20	340 kg

INSPECTION AND MAINTENANCE

1. GENERAL

The Frigg Field straddling the UK/Norwegian dividing line has four platforms subject to British Jurisdiction, CDP1, TP1, QP and FP; and two, DP2 and TCP2 under Norwegian Jurisdiction. In order to operate the four UK sector platforms, it is a legal requirement to have a current Certificate of Fitness, which is issued by a certifying Authority on behalf of the Department of Energy. This certificate is not required for the Norwegian sector platforms, although a condition evaluation is made by the Norwegian Petroleum Directorate.

In order to obtain the basis for renewal of the Certificate of Fitness and meet the requirements of the condition evaluation all platforms are subjected to major survey.

2. MAINTENANCE/INSPECTION

2.1 Maintenance and Inspection responsibilities are to ensure that all platforms, systems and equipments are kept in a proper state to meet the required production under safe conditions and according to relevant regulations.

2.2 Maintenance and Inspection activities are managed through a single computer based Maintenance Management System called OPTIMIS. The purpose of the system is to:

- organize (7-week plan, weekly plan, maintenance routines),
- formalize (Maintenance Request),
- follow up reports),

the work of all trades involved in maintenance activities, i.e. mechanics, electricity, instrumentation, telecom, inspection, production, ...

on all equipment i.e. process, utilities, static or moving, vessel or machinery.

2.3 The individual preventive routines, originally compiled from vendors recommendations are constantly revised to take advantage of the operational experience feedback.

Some rotating equipment are planned to be condition monitored to ensure that maintenance is performed before breakdown. Some others are only subject to curative maintenance. They are repaired whenever they break down.

The responsibility of deciding what type of maintenance an equipment should be submitted to, lies with Platform Maintenance, Inspection and Production management in close relation with corresponding trades onshore.

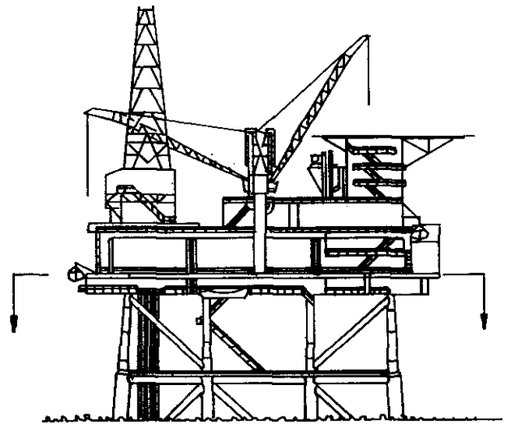
CHAPTER 3

EQUIPMENT LOCATION

CONTENTS

DIAGRAMS

Issue 1. Oct. 1980



KEY VIEW

PLATFORM NORTH

MAINTENANCE AREA

LIFEBOAT 1

WEST FLARE BOOM

CRANE PEDESTAL No 1

ROLLING DOORS

RAIL BEAM

SCRAPER TRAP PA200A

WELL KILL SCRAPER TRAP PA201

WELLHEADS 'A'–'M'

AUXILIARY ACCUMULATOR RACK

20in SEAWATER CASING

20in SEAWATER CASING

METHANOL PUMPS GA250 (ON SUPPORT FRAME)

WELLHEADS 'N'–'Z'

TEST AND START-UP SEPARATOR FA204

SCRUBBER DESANDERS FA201

HYDRAULIC POWER UNITS

SCRUBBER DESANDERS FA201

FA 205A

FA 206B

FA 203A

AIR RECEIVERS

FA 203B

AUXILIARY ELECTRIC GENERATOR ROOM

AIR CONDITIONING ROOM

FB 216B

FIRE PUMP DAY TANK

CONTROL PANEL

FIRE PUMP ROOM BATTERIES

GA 207B

ELECTRICAL WORKSHOP

FIRE PUMP ROOM NETWORK PUMP GA213

START-UP COMPRESSOR

CONTROL PANEL

GA 207A

BATTERIES

PA 204A & B

FB 216A

FIRE PUMP DAY TANK

INSTRUMENT AND MAINTENANCE SHOP

SUB-STATION

MECH. WORK SHOP

WARE HOUSE

EXCHANGER

EAST FLARE BOOM

CRANE PEDESTAL No 2

ROLLING DOORS

MAINTENANCE AREA

LIFEBOAT 2

MODULE 1

MODULE 2

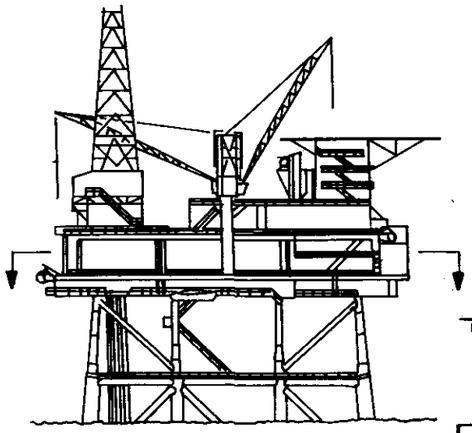
MODULE 3

MODULE 4 FIRST LEVEL

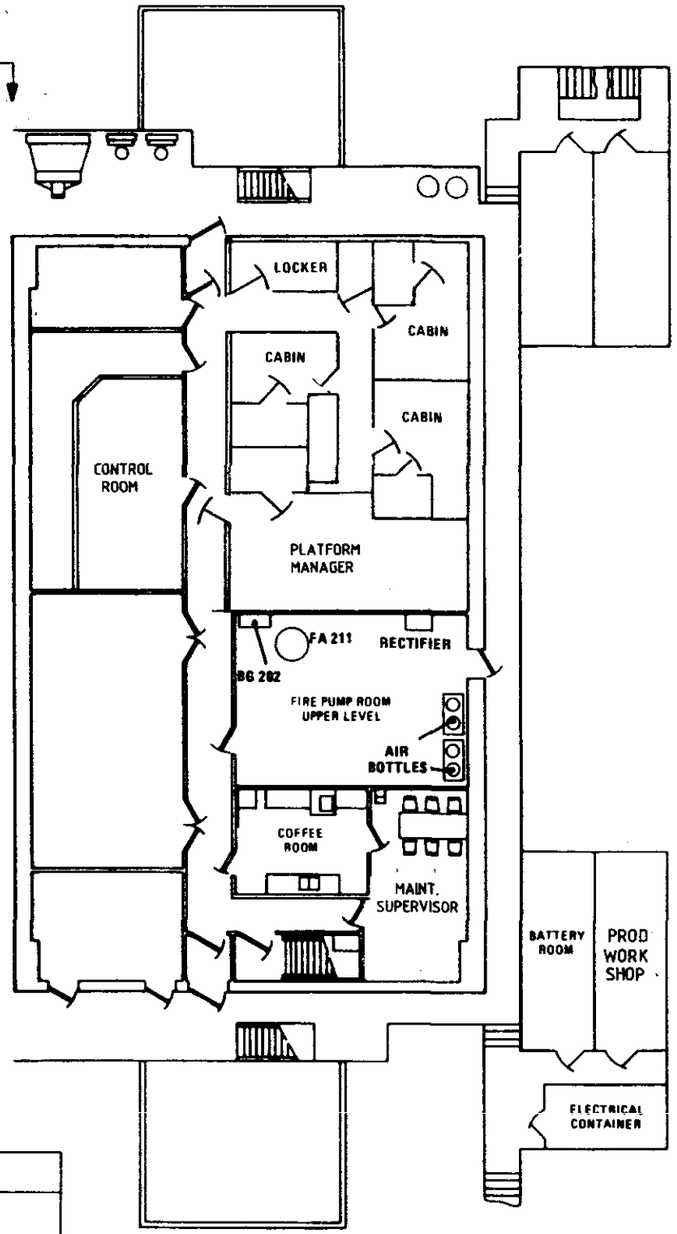
ISSUE 4, AUG. 1991

EQUIPMENT LOCATION
Production Deck

3.1.1

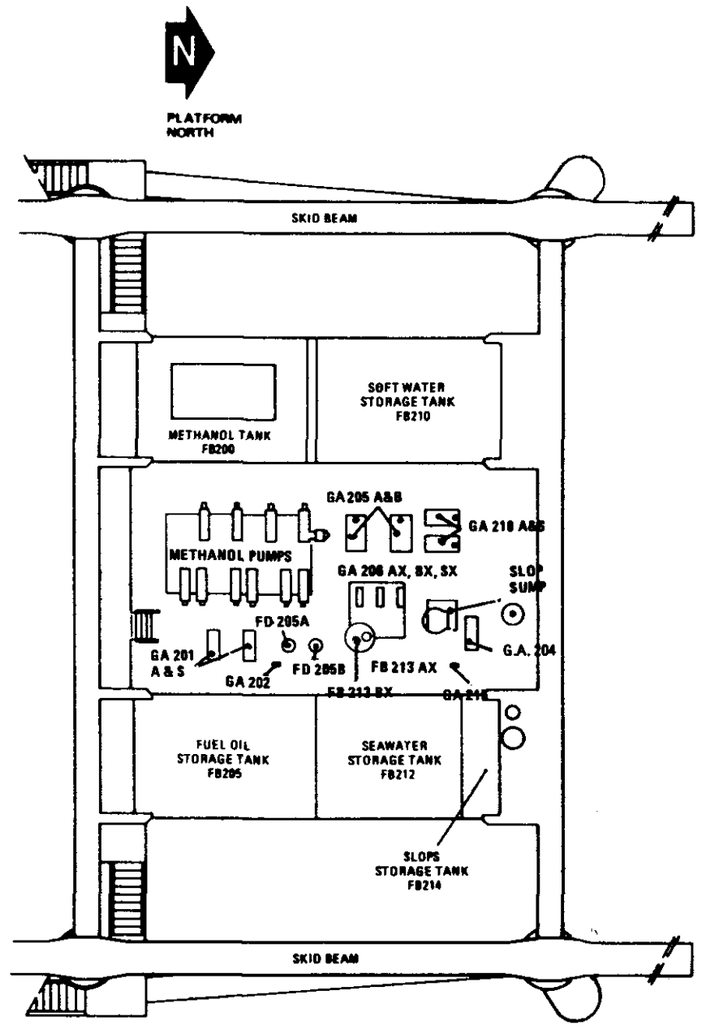


KEY VIEW



MODULE 4 SECOND LEVEL

KEY	
	RECTIFIER FOR BG201
BG 202	UV TREATMENT UNIT
FA 211	POTABLE WATER RECEIVER
BG 201	CHLORINATOR
GA 201 A AND S	GAS OIL PUMPS
GA 202	GAS OIL HAND PUMP
GA 204	SLOP PUMP
GA 205 A AND S	SOFT WATER PUMPS
GA 211 A, AND S	METHANOL PUMPS
GA 215	SUMP HAND PUMP
GA 218 A AND S	JOCKEY PUMPS
FB 213 AX AND BX	CORROSION INHIBITOR TANKS



PUMPHOUSE AND STORAGE TANKS

ISSUE 5, AUG. 1991

EQUIPMENT LOCATION

Module 4 Second Level and Pumphouse 3.1.2

CHAPTER 4

DRILLING PACKAGE

CONTENTS

DIAGRAMS

SUMMARY OF DRILLING PACKAGE

1. GENERAL

1.1 The Forex Neptune 'Unifor 1' Drilling Package is a self-contained unit built in 1967 by UEI (Union Industrielle et d'Entreprise). The package was modified in 1972 by UEI in St Wandrille, France and again in Amsterdam in 1977 when new Living Quarters were installed.

1.2 The Drilling Package comprises 13 modules, a Helideck and a 'Lee C Moore 140' drilling rig.

1.3 Details of the Drilling Package and its systems are given in the Unifor 1 Operations Manual.

2. STORAGE CAPACITY

The following storage capacity is available:

(a)	Industrial water	$107m^3$
(b)	Industrial water for brake cooling	$20m^3$
(c)	Potable water	67^3
(d)	Fuel oil	$229m^3$
(e)	Sea water	$98m^3$
(f)	Mud	$208m^3$
(g)	Bulks:	Bentonite 18 tonnes in 1 silo Cement 73 tonnes in 3 silos Barite 145 tonnes in 3 silos
(h)	Extra storage capacity for barite and bentonite totalling	$154m^3$
(i)	Drill pipe.	

3. DRILLING PACKAGE MODULES

3.1 The modules are numbered and designated as follows:

No 1	Mud Pump Room
No 2	Mud Preparation and Cementing Rooms
No 3	Auxiliaries Room
No 4	Engine Room
No 5	Sub Base
No 6	Substructure and Drilling Floor
No 7	Derrick
No 8	Living Quarters
No 9	Mud tank
No 10	Silos
No 11	Bulk cement
No 12	Generator fuel and water tanks
No 13	Sea water tank

3.2 The principal items of equipment installed in each module are listed in Tables 4.1.1 to 4.1.3.

4. PRINCIPAL SYSTEMS

4.1 Mud and Cement System

This is a low pressure mud system and a cementation circuit, and includes the following:

(a) Drilling mud production unit:

  (i) Active mud tank with mixers and hoppers

  (ii) Reserve mud tank and mixers

  (iii) Preparation mud tanks and mixers

(b) Shale shaker, desander, desilter degasser and pumps

(c) Mud pumps

(d) Cementation circuit

4.2 Pulverents System

This system is concerned with storage and handling of the following:

(a) Basic products: cement, barite and bentonite, stored in silos.

(b) Additives: starch, lime, CMC, FCL etc, stored in sacks and handled manually and/or by conveyor.

4.3 Compressed Air System

The system comprises one westinghouse 243VB diesel driven air compressors. The small compressor is not normally in use as the drilling and production plant air is supplied from TCP2 air system

4.4 Fuel Oil System

The system provides fuel for all diesel engines and the mud production unit.
The fuel oil is stored in a $220m^3$ storage tank and a $9m^3$ day tank.

4.5 Potable Water System

Potable water is stored in a $50m^3$ tank filled from the supply vessels. Distribution is via two Guinard centrifugal pumps and a hydrophore.

4.6 Industrial Water System

Industrial water for the Drill Floor, shale shakers, desilters, desander, cementing unit, mud pumps, geological laboratory, mud labratory, diesel generator heat exchangers, is stored in two tanks of $80m^3$ and $27m^3$ capacity respectively. Water is distributed by two Guinard centrifugal pumps. A third tank of $20m^3$ capacity and complete with three Guinard centrifugal pumps supplies the drilling rig brake cooling system.

4.7 Sea Water System

Sea water for the firewater system, diesel cooling, distillation etc is provided by two tanks of $63m^3$ and $35m^3$ capacity respectively.

4.8 Firewater System

The firewater system comprises two producing fire pumps GA 207 A & B. It is connected to the two sea pumps of $80m^3/h$ capacity, through an isolating valve, one electrically driven and one diesel driven. The drilling firewater is supplied by main firewater system.

4.9 Lub Oil

The lub oil system, located in Package 4, comprises two storage tanks, an electric transfer pump, a hand pump and supply lines to the six generator engines.

4.10 Drainage

Rainwater and other liquid waste is collected from drains at various points around the package and discharged overboard via the 30in slops outlet on the Production Deck.

4.11 Public Address System

The public address network covers the complete Drilling Package. For details refer to Section 9.4.

4.12 Telephone Network

Sound powered internal telephone units are located as below:

Module 6	Driller (explosion-proof) Choke manifold (explosion-proof) Shale shakers (explosion-proof)
Module 1	Mud tanks (explosion-proof)
Module 2	Mud tanks Cementing Room
Module 3	Diesel Room

4.13 Clear Call (Talk-back) System

Between the monkey board and the Drill Floor is a clear call public address system. This enables the driller to give instructions to the derrickman and vice versa.

5. CRANES

5.1 On the west side of the platform near the derrick is situated a Liebherr bos 15/400 D ex 360 Deg. revolving pedestal crane. The crane is powered by Mercedes Benz OM403 diesel engine. The boom length of the crane is 34m. 15 tonnes capacity on main and 4.5 tonnes on the whip hoist.

5.2 A Bucyrus-Erie MK 60 marine crane equipped with a 36.6 m boom is located on the east side of the platform. This crane is powered by General Motors 12V-71N twelve cylinder diesel engine and has a lifting capacity of 35.4 tonnes on the main hoist and 5.4 tonnes on the whip hoist.

TABLE 4.1.1 MODULE No 1 (MUD PUMP ROOM) FLOOR AREA 10.9m x 7.9m = 86.11M^2

Description	Qty	Type	Weight (tonnes)
Warehouse	1		3.0
Electric wiring			2.0
Oil tank			1.5
Mud pumps (Gardner Denver)	2	PZ 11 triplex	49.0
Structure			100.0
Switchboard	1		1.8
Centrifugal pumps			6.0
Miscellaneous			1.0
Piping			11.0
Tubular goods			70.0
Total weight on deck			245.3

TABLE 4.1.2 MODULE No 2 (MUD TANKS) FLOOR AREA 13.9m x 10.9m = 151.51m^2

Description	Qty	Type	Weight (tonnes)
Structure			90.0
Cementing Unit (Dowell Schlumberger)	1		28.0
Air compressors (Ingersoll Rand)	2	40MOD75	6.0
Aftercooler and air tanks (Ingersoll Rand)	1	IRSEC No 10	1.0
Surge tank (cement) 2.293m^3	1		5.0
Surge tank, 2.293m^3	1		2.0
Mud tank, 36.56m^3	1		50.0
Mud tank, 12.08m^3	1		20.5
Mud tank, 36.56m^3	1		50.0
Mud mixer	1		1.5
Mud mixer	1		1.0
Mud mixer	1		1.5
Mud tak 75m^3	1		100.0
Electric warehouse			4.0
Electric wiring			2.0
Switchboard			1.5
Piping			10.0
Miscellaneous			1.5
Mud mixer	1		1.5
Mud mixer	1		1.5
Sack storage			80.0
Half walkway			9.0
Tubular goods			122.0
Total weight on deck			**589.5**

TABLE 4.1.3 MODULE No 3 (AUXILIARIES) FLOOR AREA 12.7m x 11.9m = 151.13m^2

Description	Qty	Type	Weight (tonnes)
Structure			102.0
Warehouse			3.0
Steam boiler (Henschell) (not in use)	1	KH1000	6.0
Sea water tank	1		36.0
Potable water tank, 50m^3	1		33.0
Centrifugal water pump (Guinard)	2	2.3kW	0.8
Distallation unit (Aquachem)(not in use)	1	S300	6.0
Piping			10.0
Hydrophore	1		2.3
80m^3/h centrifugal fire pump, 75 hp electric	1		
80m^3/h centrifugal fire pump, 66 hp Lister diesel	1		3.0
Switchboard	1		0.5
150 kVA auxiliary generator (Leroy driven by Baudoin diesel engine	1 1	TA 315 DP6	4.0
Set of batteries with charger	1		0.5
Fuel day tank			3.0
Water pump (Guinard, 80m^3/h)			1.1
Warehouse			2.0
Miscellaneous			1.0
Fuel day tank			2.0
Water pump (Guinard, 10m^3/h)			0.8
Switchboard			0.5
Tubular goods			22.0
Electrical wiring			2.0
Total weight on deck			**241.5**

TABLE 4.1.4 MODULE No 4 (GENERATOR SETS) FLOOR AREA 12.7m x 9.9m = 125.73M^2

Description	Qty	Type	Weight (tonnes)
Structure			130.0
Caterpillar diesel engine, 800 hp	2	D398TA	
General Electric generator, dc	2	GE752 TI	35.0
General Electric generator, 500kW ac	2	ATI-500kW	
Caterpillar diesel engine, 800 hp	4	D398 TA	
General Electric generator, dc	4	GE752 T	56.0
Switchboard ac control panel	1		6.0
General Electric main dc control panel	1	KG 189	6.0
Westinghouse air compressor w/19kW motor	3	243 VB	3,0
Westinghouse air compressor/Lister 38 hp diesel engine	1	243 VB	1.0
Air tanks			1.0
General Electric 40kW generator (exciters for dc system)	2		2.0
Piping			10.0
Electric wiring			4.0
Exhaust system			4.0
Fuel oil tank, 9m^3			15.0
Air dryer			3.0
Workshop -warehouse			6.0
Miscellaneous			2.0
Tubular goods			26.0
Total weight on deck			**310.0**

TABLE 4.1.5 MODULE No 5 (GIRDERS, DERRICK SET) FLOOR AREA 19.6m x 7.9m = 154.84M^2

Description	Qty	Type	Weight (tonnes)
Girders			82.0
Total weight on deck			**82.0**

TABLE 4.1.6 MODULE No 6 (SUBSTRUCTURE) FLOOR AREA 10.9m X 7.9m = 86.11M^2

Description	Qty	Type	Weight (tonnes)
Derrick, part			10.0
Windshield			18.0
Substructure and floor			170.0
Equipment			133.0
Piping			25.0
Shaker			3.9
Electrical wire			5.0
Degasser			0.4
Mud in tanks			55.0
Desilter			0.6
Industrial water			24.0
Power unit			2.2
2000m drill pipes (5in)			60.0
Drill collars			40.0
BOP stack (Shaffer LWS Autolock) 16.3/4	1	WP double ram	27.0
Total weight on deck			**567.0**

TABLE 4.1.7 MODULE No 7 (DERRICK) FLOOR AREA 9.15m x 9.15m = 83.72M^2

Description	Qty	Type	Weight (tonnes)
Lee C Moore 140' x 30' x 30' derrick	1		37.0
National crown block	1	643F	4.2
National hook block	1	545G 350	7.0
Swivel National	1	N815	
Ginpole			
Travelling dolly and guides			20.0
Monkey platforms etc			
Windshield			
Flarepipe and miscellaneous			
Total weight on deck			**68.2**

TABLE 4.1.8 MODULE No 8 (LIVING QUARTERS) FLOOR AREA 24.70m x 9.75m = 240.8M^3

Description	Qty	Type	Weight (tonnes)
60/90 men capacity Living Quarters complete with Helideck structure and equipment	1		450.0
Dry store - Personnel + helicopter			50.0
Total weight on deck			**500.0**

TABLE 4.1.9 MODULE No. 9 (MUD TANK) FLOOR AREA 10M x 3m = 30m^2

Description	*Qty*	Type	*Weight* (tonnes)
Mud tank	1		92.0
Hydraulic agitator	7		2.7
Total weight on deck			**96.0**

TABLE 4.1.10 MODULE No 10(BULKS-LOGGING UNIT) FLOOR AREA 21.00M x 3.45m = 72.45m^2

Description	Qty	Type	Weight (tonnes)
Structure with 80m^3 water tank	1		115.5
Cement bulks (silos)	3		86.5
Barite bulks (silos)	3		158.5
Bentonite bulk (silo)	1		22.5
Logging unit	1		11.0
Total weight on deck			**394.0**

TABLE 4.1.11 MODULE No 11 (EXTRA BULK PRODUCT TANKS)

Description	Qty	Type	Weight (tonnes)
Bentonite bulks (silos)	3		100.5
Barite bulks (silos)	4		220.0
Total weight on deck			**320.5**

TABLE 4.1.12 MODULE No 12 (FUEL/WATER TANKS)

Description	Qty	Type	Weight (tonnes)
Fuel tanks 12A and 12B	2		110.0
Potable water tank	1		56.5
SACM AS HZ diesel engine	1	MGOV12	15.0
Unilec as generator 330V-50Hz	1	AT400L B9D	
Total weight on deck			**181.5**

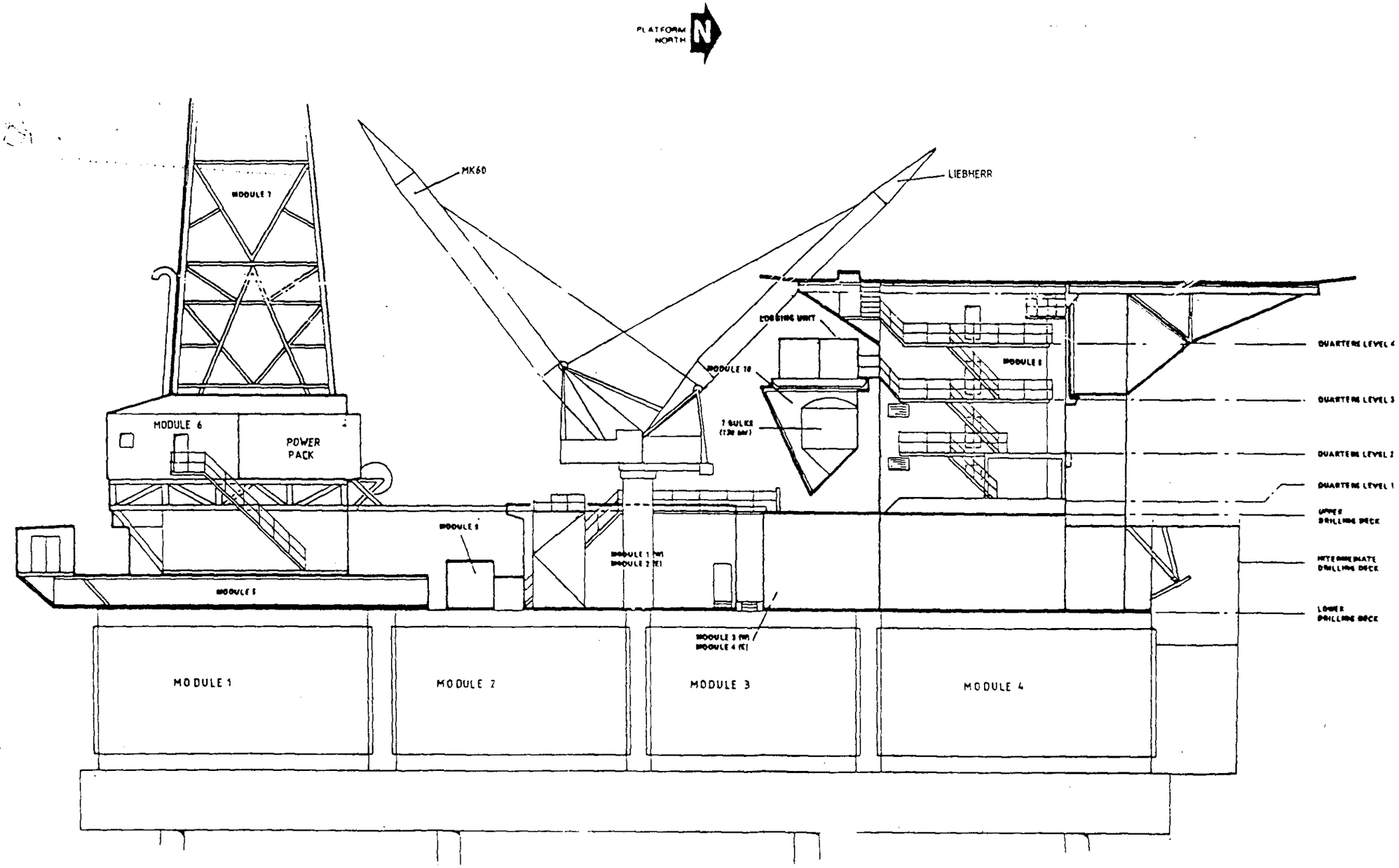
TABLE 4.1.13 MODULE No 13 (SEA WATER TANK) FLOOR AREA 5.7m x 3.0m = 17.1m^2

Description	Qty	Type	Weight (tonnes)
Structure			16.0
Sea water (maximum)			64.0
Total weight on deck			**80.0**

6 DP2 - DRILLING PACKAGE INTERFACE

System/Function	Production	Drilling
Compressed air	Flare burner	PA2011 (2in)
Firewater		NW2011 (6in)
Pilot gas	Flare burner	FG2000 (1/2in)
Vent	Flare burner	NF2004 (10in)
Gutterways (polluted)	Polluted water	GUTTERWAYS

Alarms	Production		Drilling
General Alarm			
Emergency Shutdown DP" Control Room		_____	Drillers Console Panel in passageway outside Main Diesel Room
Muster Alarm			
Disaster Shutdown			
Gas Emergency		AUTOMATIC BY GAS DETECTORS	
	General Platform Alarm		
Fire Emergency		AUTOMATIC BY FIRE DETECTORS	
Public Address System (Loudspeakers throughout production and drilling)	DP2 Control	_____	All loudspeakers
	All loudspeakers	_____	Radio Room



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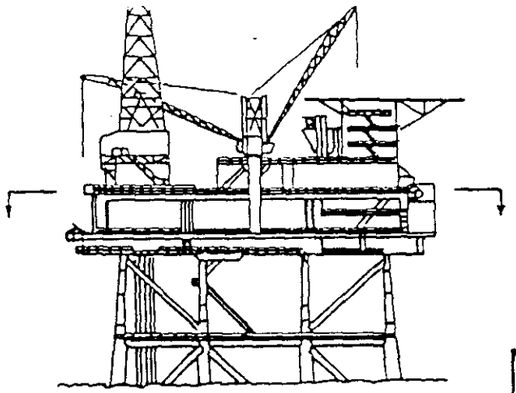
SUMMARY OF DRILLING PACKAGE Platform East Elevation	4.1.1



KEY VIEW

PLATFORM NORTH N

SHALE SHAKERS
DEGASSER
DESILTERS
MUD DITCH
DESANDER TANK
SETTLING TANK
BOP ACCUMULATOR UNIT
POWER PACK
CHOKE MANIFOLD
MODULE 5
MODULE 6
MODULE 5
COOLING PUMPS
FOAM UNIT
WAREHOUSE
MODULE 10
SEA WATER TANK
MUD CONTAINER PLFORM
MUD PUMP
MODULE 1
MUD PUMP
CENTRIFUGAL MUD PUMPS
MUD TANK No.1
MUD TANK No.2
MUD TANK No.3
MUD TANKS
MODULE 9
SWITCH BOARDS
MUD TANK
MODULE 2
WARE HOUSE
CEMENTING UNIT
AIR COMP
MUD POWER PACK AGITATOR
FOAM UNIT MUD ROOM
FUEL TANK
FUEL TANK
POTABLE WATER TANK
MODULE 12
DRUM
INDUSTRIAL WATER PUMPS
FIRE PUMP GEN
WASHING PUMP
WARE HOUSE
EMERGENCY GENERATOR
MODULE 3
SEA WATER TANK
INDUSTRIAL WATER TANK
SWITCHBOARDS
MECH WISHOP
MODULE 4
ENGINES
WISHOP
CHANGE ROOM CONTAINER
ELECT WARE HOUSE

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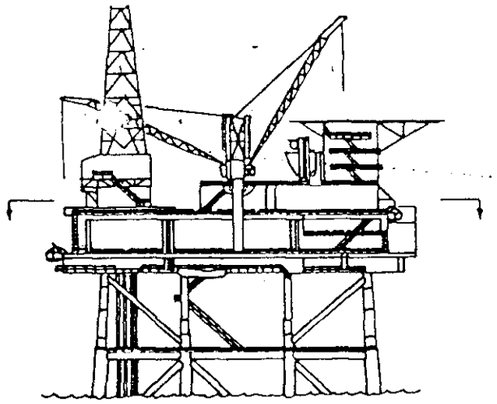
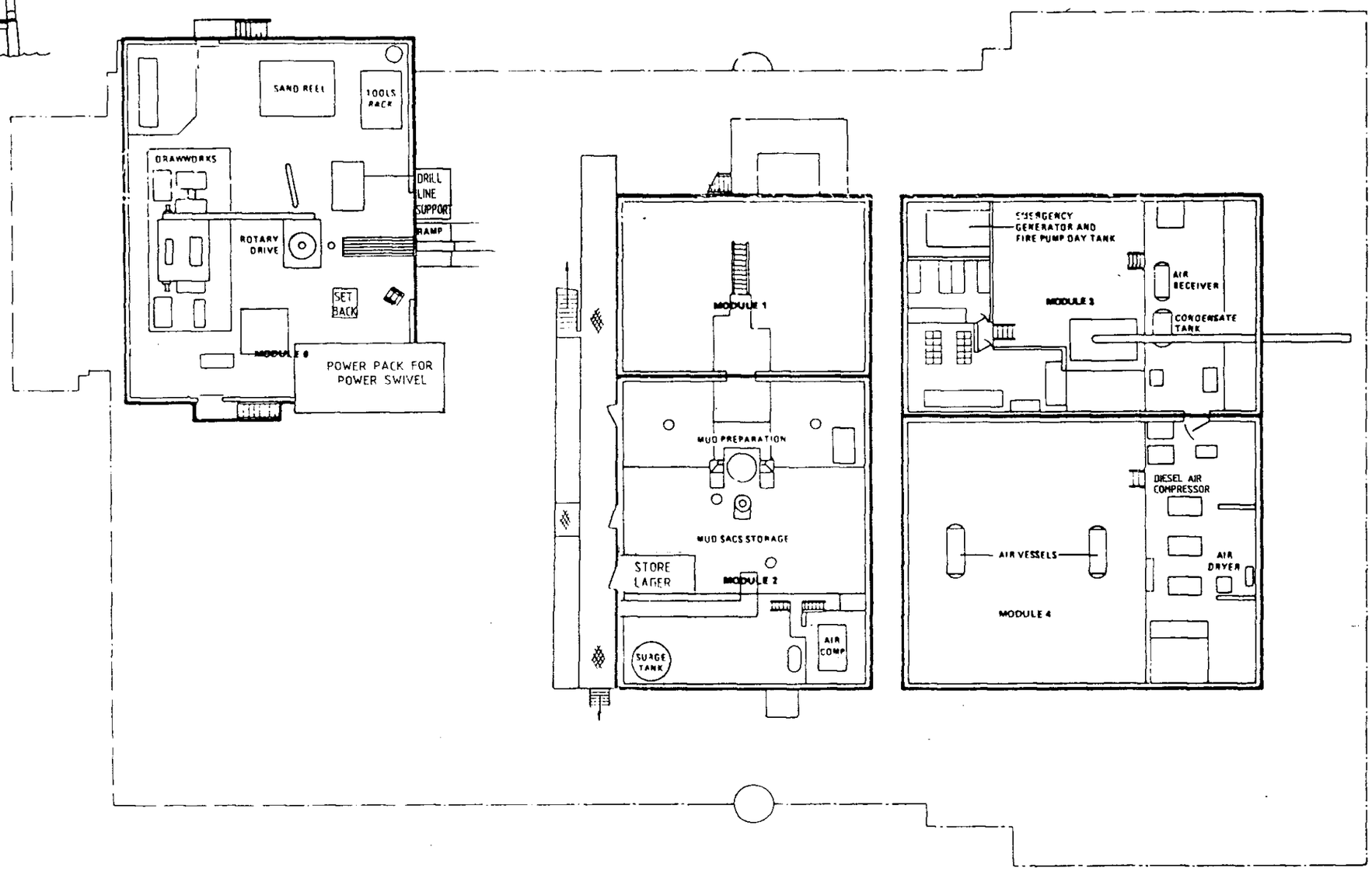
SUMMARY OF DRILLING PACKAGE
Lower Drilling Deck

4.1.2



KEY VIEW

PLATFORM NORTH



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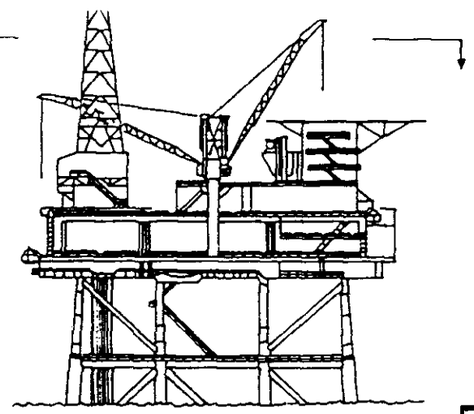
SUMMARY OF DRILLING PACKAGE

Intermediate Drilling Deck

4.1.3



KEY VIEW

PLATFORM NORTH N

MK60 MAINT. PL.FORM

MODULE 5

MODULE 7

MODULE 6

MODULE 1

MODULE 9

MODULE 2

CONTAINER

CONTAINER

MODULE 10

DP2

H

DP2

LIEBHERR MAINT. PL.FORM

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SUMMARY OF DRILLING PACKAGE

Upper Drilling Deck

4.1.4

AREA CLASSIFICATION

1. GENERAL

1.1 The drilling package areas have been evaluated for risk using the institute of Petroleum Model Code of Safe Practice, Parts 1 and 8 - Lighter-than-air Gases, as shown in Table 4.2 and on Diagrams FF 83 23 00 9010.

1.2 A dangerous area is one in which there exists or may exist a dangerous atmosphere. These areas are classified Zone 1 and Zone 2 as defined below.

ZONE 1 An area in which a dangerous atmosphere is likely to occur under normal operating conditions.

ZONE 2 An area in which a dangerous atmosphere is only likely to occur under abnormal operating conditions.

1.3 Areas not included in a dangerous category as above are termed Unclassified, and are achieved as follows:

(a) Pressurising an enclosed space with air taken from an unclassified area.

(b) Defining exterior areas which are considered to be an adequate distance from any possible gas or vapour escapes so that the gas or vapour will be dispersed before reaching this area.

(c) Force-vented areas which have a high rate of ventilation with air coming from an unclassified area.

NOTE! A pressurised or force vented area may be classified as zone 1 in case of ventilation failure.

TABLE 4.2 DRILLING PACKAGE MODULES - AREA CLASSIFICATION

Module Area/Equipment	Area Classification	Type of Ventilation
1 Mud Pump Room	Zone 1	Forced vent under negative pressure
2 Mud preparation Room	Zone 1	Forced vent under negative pressure
and Cementation Room	Unclassified	Ventilated and pressurised
3 Auxiliaries Room	Unclassified	Ventilated and pressurised
4 Engine Room	Unclassified	Ventilated and pressurised
5 Sub Base	Zone 2	Natural
6 Substructure and Drill Floor	Zone 1	Natural
7 Derrick	Zone 2	Natural
8 Living Quarters	Unclassified	Ventilated and pressurised
9 Mud tanks	Zone 1	Forced Vent under negative pressure

TABLE 4.2 DRILLING PACKAGE MODULES - AREA CLASSIFICATION (con't)

Module	Area/Equipment	Area Classification	Type of Ventilation
10	Logging unit	Unclassified	Natural
11	Bulk cement	Unclassified	Natural
12	Fuel tank, portable water tank, generator	Unclassified	Natural
13	Helideck	Unclassified	Natural

ALARMS AND SHUTDOWNS

1. GENERAL

The shutdown of Drilling facilities are based on the same principles and are part of the overall Platform Shutdown system.

2. DESCRIPTION

Reference is made to section 10.5

General shutdown of Drilling facilities are activated upon:

Platform 1st level shutdown (DSD)

Platform 2nd level shutdown (ESD)

Platform 3rd level shutdown activates local shutdown of Drilling or production facilities relevant to the cause of shutdown.

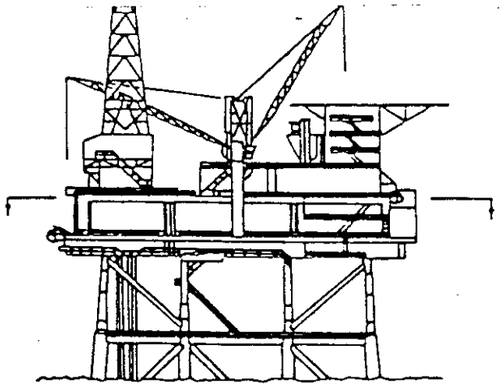
A by-pass facility has been arranged for use during drilling work-over operations, inhibiting shutdown effects on essential drilling equipment. The "Abandon Platform" buttons located close to Lifeboats No 1 & 2 provide a total shutdown of all drilling equipment.

ALARMS AND SHUTDOWNS

Type of Emergency	Alarm/Local	Activation Source	Source Location	Alarm Area
	Red Flashing Lights	Pushbuttons	Throughout the package	(a) Production Control Room (b) Drill Floor Console (c) In the Passage outside the Main Diesel Room
General Platform Alarm Gas/Fire	Public Address	Gas Detectors Fire Detectors	All hazardous areas Ventilation inlets Forex L.Q.	(a) Production Control Room (b) Drill Floor Console (c) In the Passage outside the Main Diesel Room

ALARMS AND SHUTDOWNS

Type of Emergency	Alarm/Local	Activation Source	Source Location	Alarm Area
General Alarm	Klaxon in the Drilling Package Control Room	Pushbuttons	Drilling Package Radio Room	Drilling Package Radio Room
			Drill Floor Console	Production Control Room
Disaster Shutdown (DSD)		Pushbuttons	Radio Room, Drill Floor Console,	Platform 1st Level Shutdown
Abandon Platform (power stop)		Pushbuttons	Lifeboats 1&2	
Generator Emergency Shutdown		Pushbuttons	Drill Floor Console Engine Room	Drilling Package Generators
Emergency Shutdown (ESD)		Pushbuttons	Drill Floor Console Helideck	Platform 2nd Level Shutdown
Muster Alarm Abandon Platform	See also Section 10.5	Public address System	Production Control Room	Throughout the Platform



KEY VIEW

PLATFORM NORTH N

KEY

- FAB — FIRE ALARM BUTTON (DELUGE MANUAL VALVE)
- GESO — GENERAL EMERGENCY SHUTDOWN
- RSD — RIG SHUTDOWN PUSHBUTTON
- R — RED OR BLUE FLASHING LIGHT
- FIRE ALARM FLASHING LAMP

SHALE SHAKERS
DEGASSER
DESILTERS
MUD DITCH
DESANDER
SETTLING TANK
POWER PACK
BOP ACCUMULATOR UNIT
COOLING PUMPS
FOAM UNIT
WAREHOUSE
SEA WATER TANK
FUEL TANK
POTABLE WATER TANK
MUD CONTAINER PLFORM
MUD PUMP
CENTRIFUGAL MUD PUMPS
MUD TANK No 1
MUD TANK No 2
MUD TANK No 3
MUD TANK
SWITCH BOARDS
WARE-HOUSE
CEMENTING UNIT
AIR COMP
MUD AGITATOR POWER PACK
FOAM UNIT MUD ROOM
DRUM
INDUSTRIAL WATER PUMPS
WASHING PUMPS
FIRE PUMP GEN
EMERGENCY GENERATOR
SEA WATER TANK
INDUSTRIAL WATER TANK
SWITHBOARDS
MECH W/SHOP
ENGINES
W/SHOP
ELECT WARE-HOUSE
CHANGE ROOM CONTAINER

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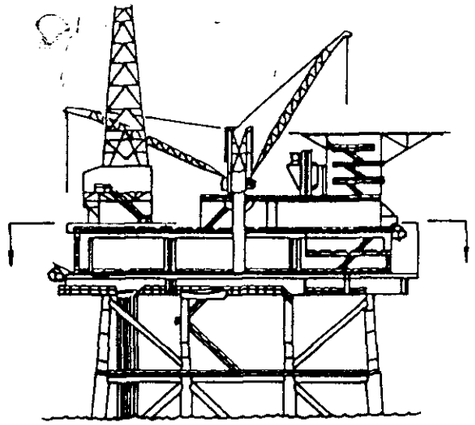
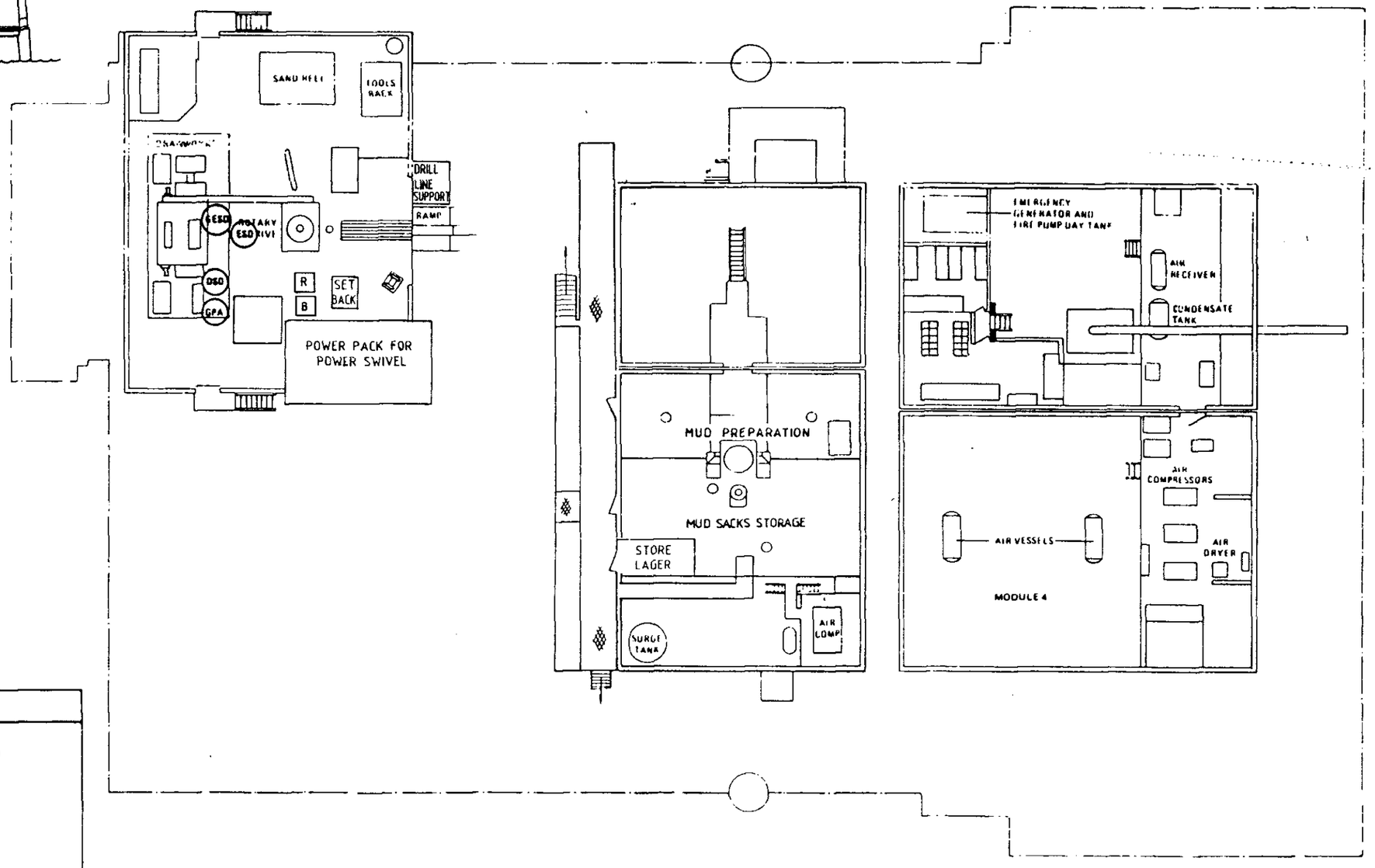
ALARMS AND SHUTDOWNS
Lower Drilling Deck

4.3.1



KEY VIEW

PLATFORM NORTH N



KEY

- FAB — FIRE ALARM BUTTON (DELUGE MANUAL VALVE)
- GPA — GENERAL PLATFORM ALARM
- DSD — DISASTER SHUTDOWN PUSHBUTTON
- ESD — EMERGENCY SHUTDOWN PUSHBUTTON
- MA — MUSTER ALARM
- RSD — RIG SHUTDOWN PUSHBUTTON
- GESD — GENERATOR EMERGENCY SHUTDOWN
- R — RED OR BLUE FLASHING LIGHT
- FIRE ALARM FLASHING LAMP

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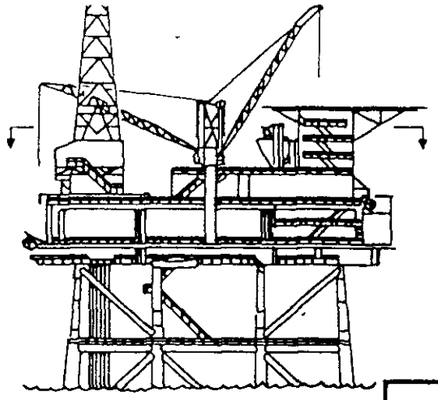
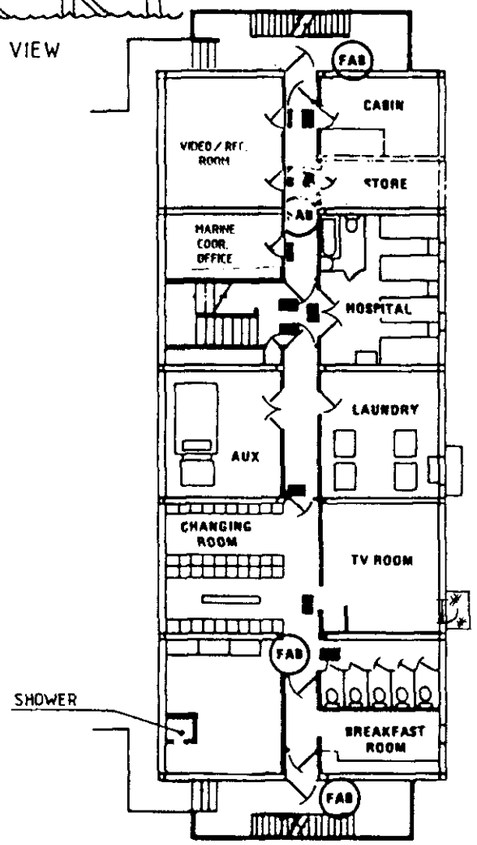
ALARMS AND SHUTDOWNS
Intermediate Drilling Deck

4.3.2

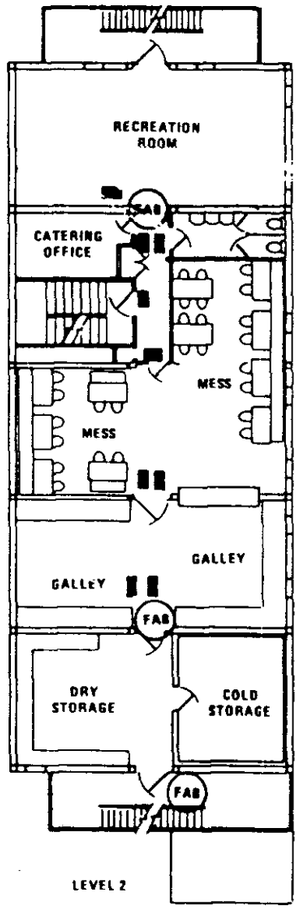


KEY VIEW

PLATFORM NORTH



LEVEL 1



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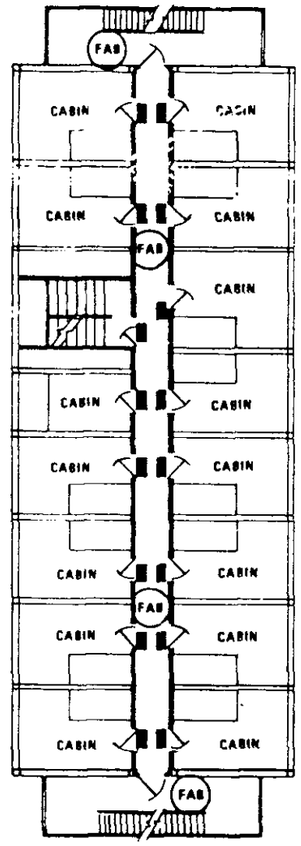
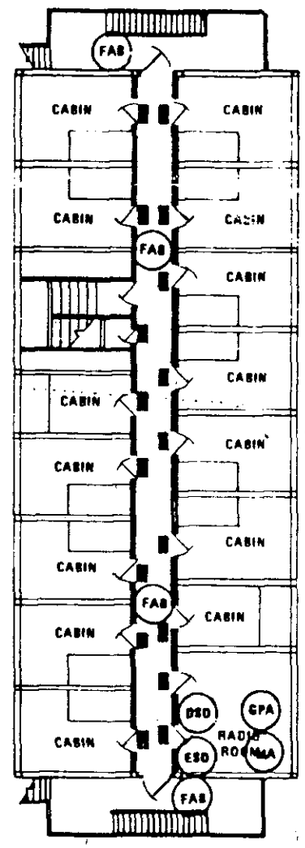


LEVEL 3

NOTE: THIS LEVEL IS MOTHBALLED & NOT IN USE.



LEVEL 4

KEY		
FAB FIRE ALARM BUTTON	DSD DISASTER SHUTDOWN PUSHBUTTON	GPA GENERAL PLATFORM ALARM
FIRE ALARM FLASHING LAMP	ESD EMERGENCY SHUTDOWN PUSHBUTTON	
	MA MUSTER ALARM	

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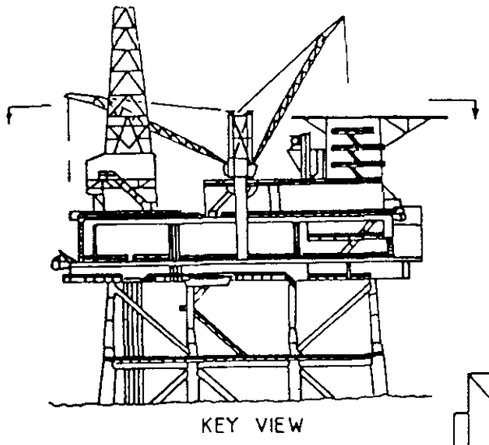
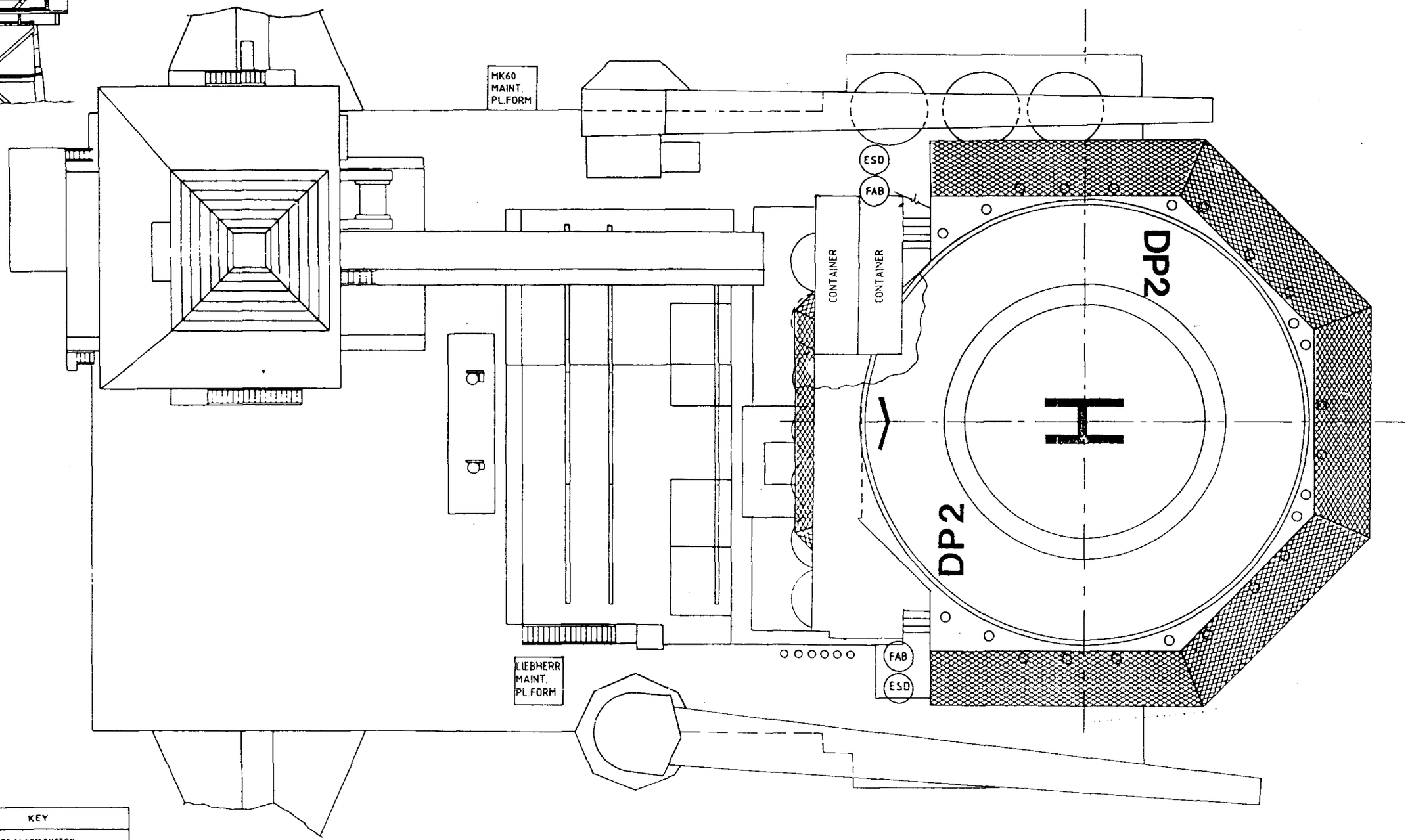
ALARMS AND SHUTDOWNS
FOREX Living Quarters

4.3.3



KEY VIEW



KEY

FAB FIRE ALARM BUTTON (DELUGE MANUAL VALVE)

ESD EMERGENCY SHUTDOWN PUSHBUTTON

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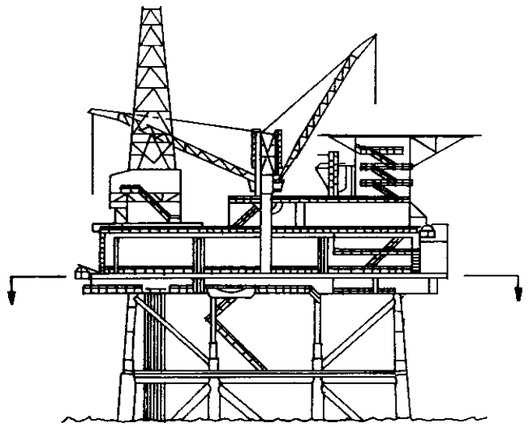
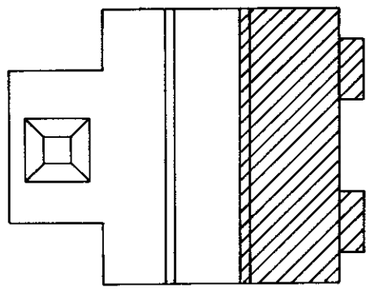
ALARMS AND SHUTDOWNS

Upper Drilling Deck

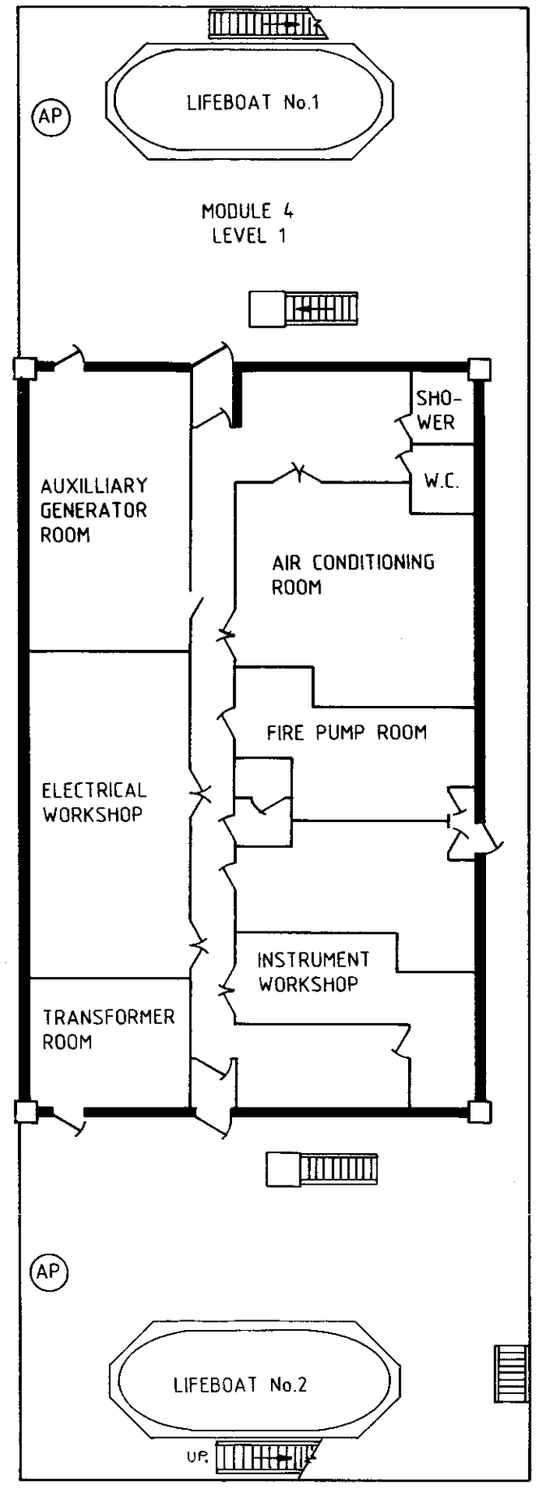
4.3.4



KEY VIEW



PLATFORM NORTH



KEY
(AP) ABANDON PLATFORM POWER STOP.

ISSUE 1, , AUG. 1991

ALARMS AND SHUTDOWNS. PRODUCTION DECK - MODULE 4.	4.3.5

FIREFIGHTING AND SAFETY EQUIPMENT

1. GENERAL

1.1 The following firefighting equipment is provided:

(a) Firewater System
(b) Portable Extinguishers
(c) Halon Systems
(d) Sprinkler Systems
(e) Helideck Foam System
(f) Drilling Rig & Modules Foam System

1.2 The following safety equipment is provided:

(a) Lifeboats
(b) Liferafts
(c) Lifebouys
(d) Lifejackets

2. FIREFIGHTING EQUIPMENT

2.1 Firewater System

2.1.1 The firewater system comprising a ring main and hosereels is supplied by the two production firewater pumps GA 207 A/B. Two seawater pumps are also connected to the ring main, Mct 3.01 driven by a diesel engine and Mce 3.20 driven by an electric motor.

2.1.2 Firewater pumps GA 207 A/B are located in the PM 4, for details see also section 10.9. Seawater pumps are located in package 3 taking their suction from seawater tank Ct 4.14 and supply seawater to the eight hosereels on the Lower deck and the fuel tank sprinkler system.

2.2 Portable Extinguishers

Portable extinguishers and associated equipment are distributed as shown in Table 4.4.

2.3 Halons Systems

2.3.1 The halon fire extinguishing system can be automatically or manually operated. In the automatic mode, the system is activated by the operation of the appropriate fire detection sensors in that area. In the manual mode, the system is released manually. Outside the main entrance of each room which is protected by a Halon system, there is a halon releasing handle connected to halon release mechanism via a steel wire. As part of this mechanical release system, an electrical switch is installed for transferring a signal back to the fire panel and initiate the necessary shutdown functions.

In either the automatic or manual modes there is a time delay of 10 seconds to allow for the evacuation of personnel before the halon is released.

2.3.2 Halon status panels are located outside each room exit which is protected by a Halon system. They indicate the system status as follows:

(a) Red Lamp illuminated - Halon being released.
(b) Green Lamp illuminated - System in manual control
(c) Amber Lamp illuminated - System in automatic control.

2.3.3 The following areas are protected by Halon system on Drilling

(a) Engine Room (Drilling package 4)
(b) Emergency Room (Drilling package 3)
(c) Switch Board (Drilling package 3)
(d) Electrical Warehouse (Drilling package 3)
(e) Auxiliary Room (Forex L.Q.)
(f) Radio Room (Forex L.Q.)
(g) Switch Board (Drilling package 2)
(h) Hydraulic Power Pack (Drilling package 6)

2.4 Sprinkler Systems

Wet pipe sprinkler systems, pressurised from the platform firemain are provided in the Living Quarters.

2.5 Hosereels (Water)

Firewater hosereels distributed throughout the Drilling Package are supplied from fire pumps GA 207 A/B via ring main, and it is also interconnected to the two seawater pumps Mct 3.01 and Mce 3.20.

2.6 Helideck Foam System

The helideck foam system comprises the following:

(a) Four foam/water monitors on helideck, two manually operated and two automatic.

(b) Foam unit is located under helideck, including selection and release valves.

(c) Local control console is located under helideck, beside the foam unit.

(d) Two foam release stations at helideck, by each staircase.

2.6.1 The helideck foam system is pneumatically controlled:

(a) From local control console (1 off)
Selection of operating monitors, two out of four. The two operating monitors are selected according to actual wind direction.

Water is supplied from the platform firemain.

Foam release by opening of firemain control valve (air to open). This valve is provided with manual override in case of air failure.

By activation, a pressure switch activate an alarm in control room.

Reset of firemain control valve, by venting air line.

In addition to the pneumatic control, the monitor valve position (two in operation) are indicated on the local control console mimic.

(b) From Local Release stations (2 off) located on both staircases of the helideck.

Foam release by opening of fire main control valve.

2.7 Drilling Packages 1, 2 & 9 Foam System

Drilling packages 1 & 2 comprise the following:

(a) Two oscillating monitors located within the modules (1 & 2)

(b) Open deluge heads in mud tanks 1, 2A, 2B, 3, 4, 5A * & 6* (* Located in PKG. 9. External mud tanks).

(c) Foam unit is located outside the cement & acidizing room on the east side.

(d) Three foam release stations are mounted at the exit doors of PKG 1 & 2, and two are mounted at the foam skid #2.

2.7.1 Drilling packages 1, 2 & 9 are both pneumatically & electrically controlled for release of foam. (System 2).

Electrical control is by smoke detection in the relevant area, and activates foam release, stops HVAC system and initiates correct platform shutdown levels.

Pneumatic control is by H.A.D. fusible plugs - automatic and foam release stations, F.R.S., which are manually pulled. An electrical pressure switch monitors the pneumatic signal and performs the interface to the electrical shutdown & alarm systems.

3. SAFETY EQUIPMENT

3.1 General

The lifesaving appliances, which provide the primary means of evacuaion of personnel from the Drilling Modules, consist of 2 x 42-man lifeboats, five 20-man liferafts and eight lifebuoys. Lifeboats for drilling are #1 or #2.

3.2 Lifeboats 1 & 2

The Lifeboat Station has a fibreglass Schat Watercraft Mk 11 motor lifeboat equipped with full survival equipment. The boat is powered by a 29.5 hp Lister HRW2 water-cooled diesel engine with Bryce Berger hydraulic starting equipment and Borg Warner hydraulic gears. The boat is equipped with a water spray system operated by a Watercraft CP 10 compressed-air driven pump. The air exhausted from the pump is sufficient to supply the engine when running at full throttle, to provide air for personnel and to maintain a slight pressure in the passenger space to exclude toxic fumes. The boat is raised and lowered by means of Schat davits (type ORD/DHM) and winch (type BE 7500) equipment. The descent is controlled between 60 and 120 ft/min from inside the boat by operating a clutch wire attached to the electric drive motor which is not powered for this operation. The boat is raised either by using the electric motor or by a cranking handle which engages the motor dirve shaft.

3.3 Liferafts

The five 20-man liferafts are stored in sealed containers. When required the liferafts are inflated on deck and are lowered by davits with up to 20 men on board.

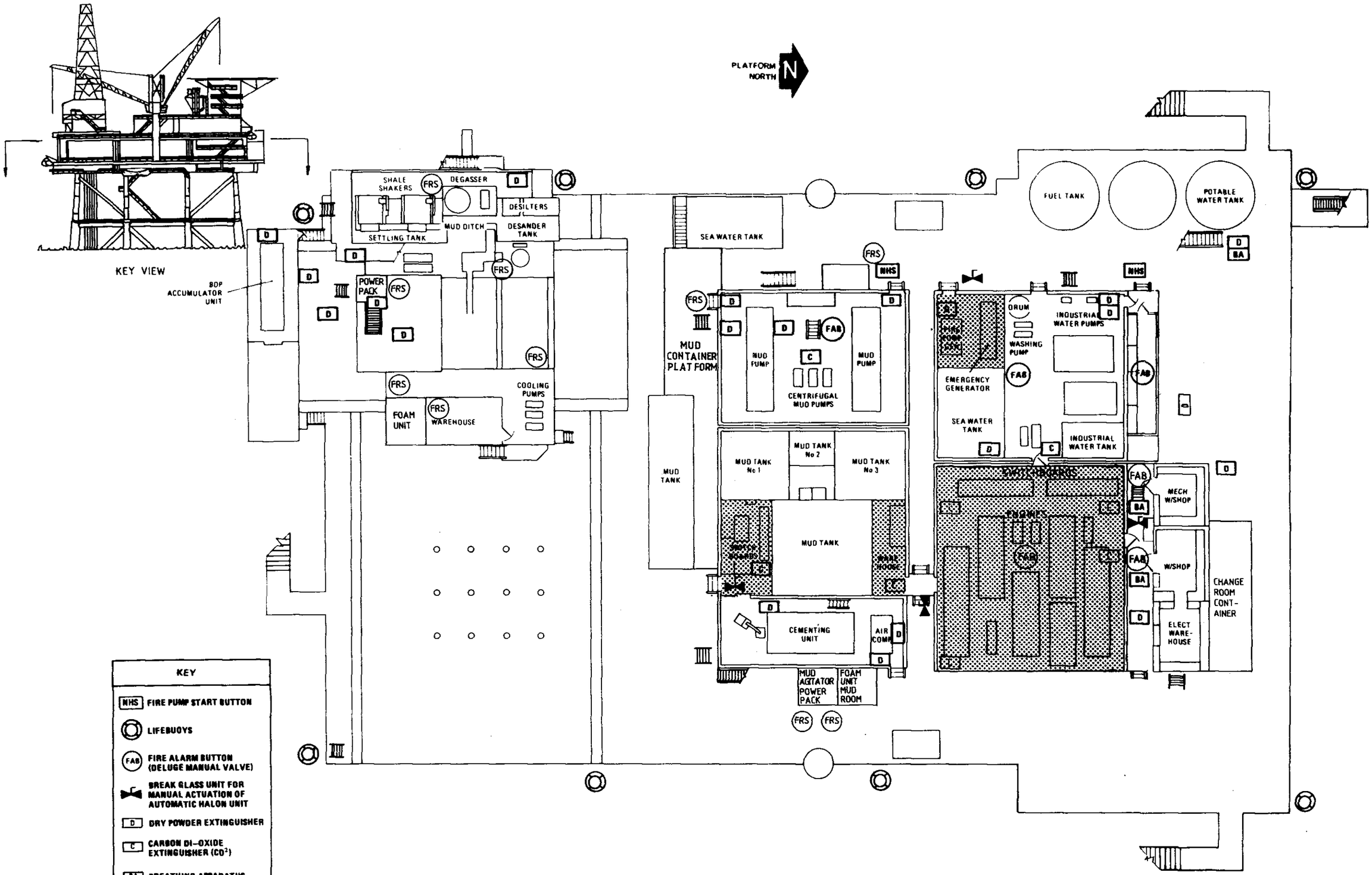
3.4 Lifebuoys

Eight lifebuoys complete with water-activated lights and lifelines are located externally around the Lower Drilling Deck.

TABLE 4.4 PORTABLE FIRE EXTINGUISHERS AND EQUIPMENT

Location	Portable Extinguishers		Dry Powder	Breathing Apparatus	Fireman's Outfit	Emergency Equipment
	CO2	Gas/Water				
Helideck	3	-	2	-	2	3
East Crane	1	-	1	-	-	-
West Crane	1	-	1	-	-	-
Living Quarters:						
Level 4	3	2	1	-	2	-
*Level 3	1	2	2	-	-	-
Level 2	2	1	5	-	-	-
Level 1	4	-	5	-	-	-
Intermediate Drilling Deck	2	-	10	2	1	-
Lower Drilling Deck	8	-	19	2	-	

* Note level 3 is mothballed and not in use.



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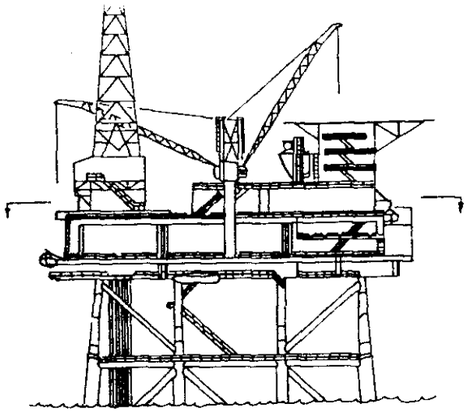
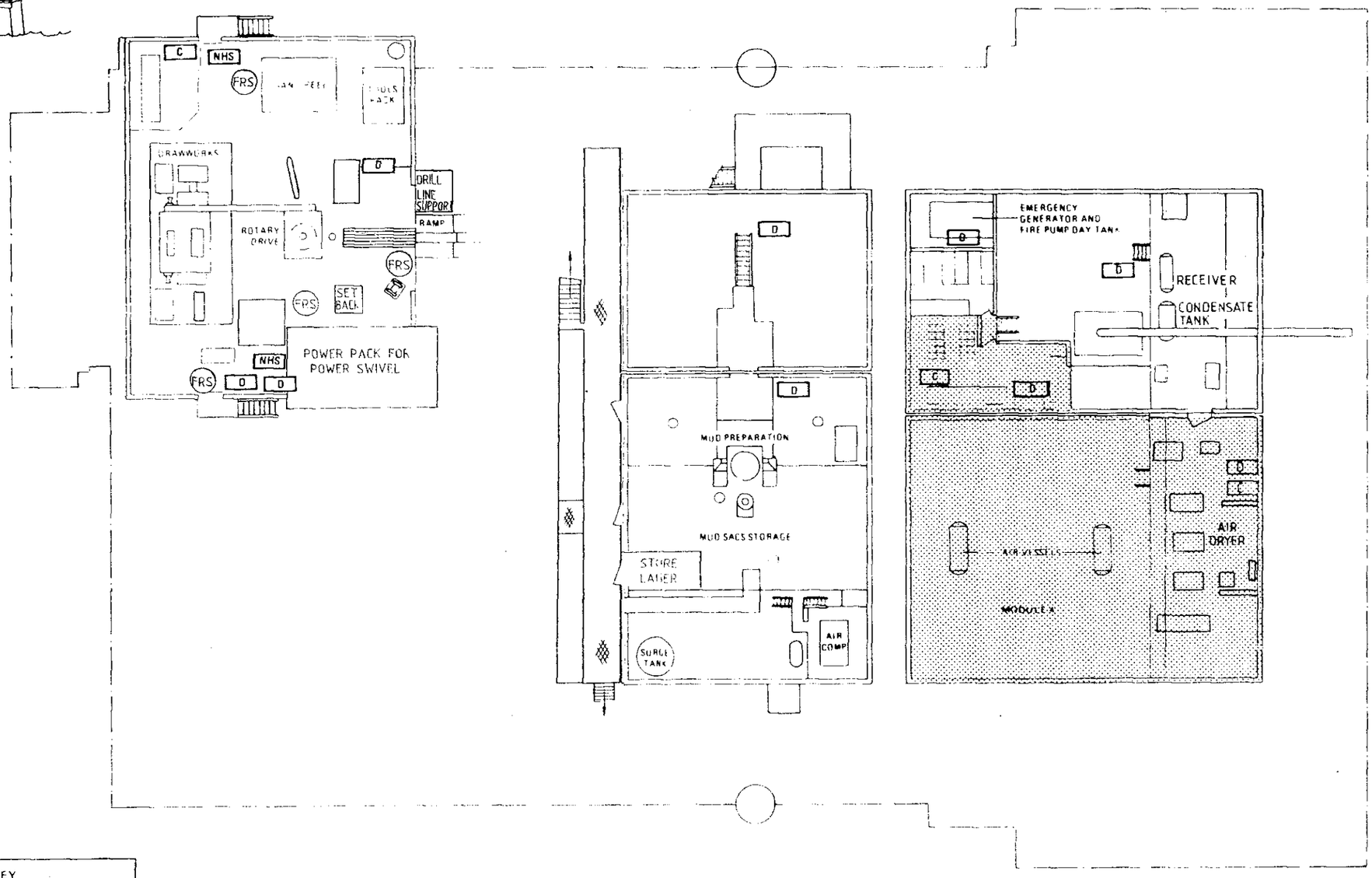
FIREFIGHTING AND SAFETY EQUIPMENT
Lower Drilling Deck

4.4.1



KEY VIEW

PLATFORM NORTH N



KEY

- FAB — FIRE ALARM BUTTON (DELUGE MANUAL VALVE)
- C — CARBON DIOXIDE EXTINGUISHER (CO^2)
- D — DRY POWDER EXTINGUISHER
- NHS — FIRE PUMP START SWITCH
- AREA PROTECTED BY HALON
- FPS — FOAM RELEASE STATION

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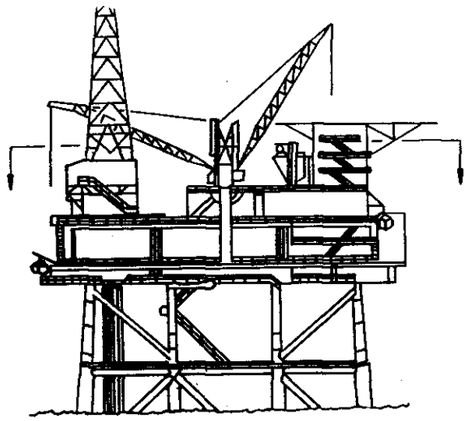
FIREFIGHTING AND SAFETY EQUIPMENT

Intermediate Drilling Deck

4.4.2

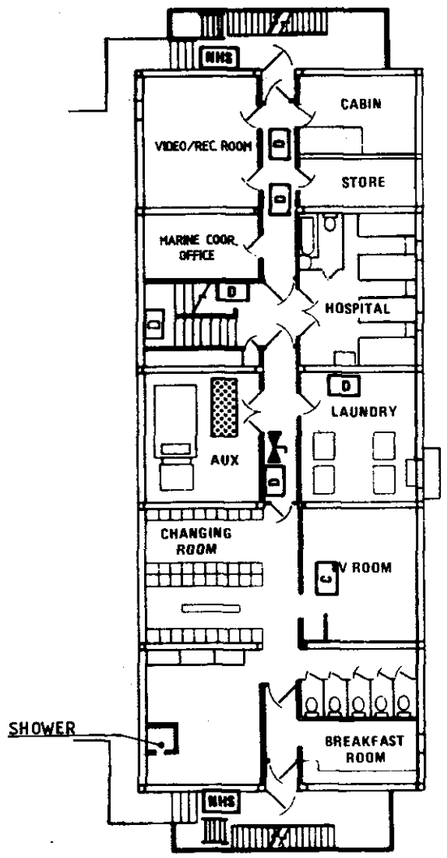


KEY VIEW

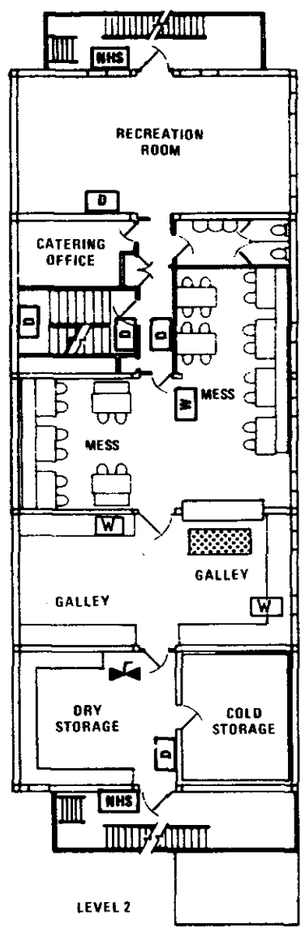
PLATFORM NORTH N

KEY

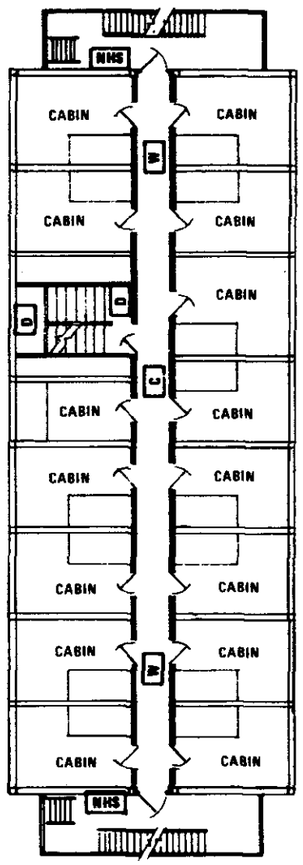
- NHS — FIRE PUMP START SWITCH
- MANUAL ACTUATION OF AUTOMATIC HALON UNIT
- C — CARBON DIOXIDE EXTINGUISHER (CO^2)
- D — DRY POWDER EXTINGUISHER
- W — PORTABLE WATER EXTINGUISHER
- FIRE WATER HOSE REEL
- AREA PROTECTED BY HALON



LEVEL 1

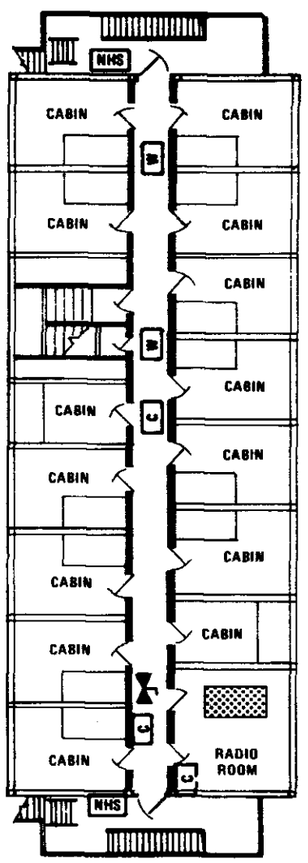


LEVEL 2

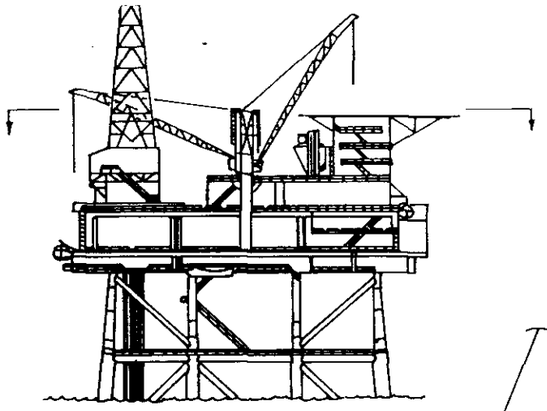


LEVEL 3

NOTE: LEVEL 3 IS 'MOTHBALLED' AND NOT IN USE.



LEVEL 4



KEY VIEW

PLATFORM NORTH N

MK60 MAINT PL.FORM

LIEBHERR MAINT PL.FORM

CONTAINER

CONTAINER

MANUAL A

AUTO C

DP2

H

D MANUAL

B AUTO

DP2

KEY

- FAB — FIRE ALARM BUTTON (DELUGE MANUAL VALVE)
- F — FIREMANS OUTFIT
- D — DRY POWDER EXTINGUISHER
- C — CARBON DIOXIDE EXTINGUISHER (CO^2)
- EE — EMERGENCY EQUIPMENT
- C — DRY CHEMICAL HOSE REEL
- F — FIRE WATER HOSE REEL
- WATER / FOAM CANNON

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FIRE FIGHTING AND SAFETY EQUIPMENT

Upper Drilling Deck

4.4.4

GAS AND FIRE PROTECTION

1. GENERAL

Gas and fire detection sensors are installed throughout the Drilling Package to provide early warning of high hydrocarbon gas levels and the presence of smoke or fire.

2. GAS DETECTION

2.1 The gas detectors used on the drilling modules are Sieger Model 1412 series with type 780 explosion proof sensor heads. Each gas detection loop comprises one sensor and one control unit. Each sensor transmits an electrical signal proportional to the detected level of gas to its associated control unit.

2.2 Each Control Unit contains two manually adjustable alarm set points. Each set point is individually adjustable between 0 and 100% of the lower explosive limit (LEL) of gas to air mixture. The LEL value set on each control unit is based on the location of its sensor, i.e

(a)	In the Living Quarters ventilation ducting	15% LEL
(b)	In all other areas	20% LEL

2.3 The Control Units are installed in the Sieger Gas Detection Cabinet which is located in the Production Control room on the PM-4.

3. FIRE DETECTION

3.1 **Four types of detectors are used in the Drilling Modules as follows:**

(a) Smoke detectors.
(b) Thermovelocimetric (heat rise) detectors.
(c) Optical detectors
(d) H.A.D. - Fusible plugs.

3.2 Smoke Detectors

3.2.1 There are 115 Cerberus smoke detectors used to provide early detection of fire outbreaks. The detectors operate by sensing the visible and invisible gases emitted by a smouldering fire. They are loacted as follows:

Intermediate Drilling Deck	Package 2:	8
	Package 3:	2
	Package 4:	2
Lower Drilling Deck	Package 2:	4
	Package 3:	2
	Package 4:	4
	Change Room Container	2
Upper Drilling Deck	Drill Floor	1
	Hydraulic Power Pack	2
	Total	25

Living Quarters	Level 1:	17
	Level 2:	13
	Level 3:	29
	Level 4:	31
	Total	90

3.3 Thermovelocimetric Detectors

3.3.1 There are 18 Cerberus thermovelocimetric detectors used to provide early detection of fire outbreaks. The detectors operate by reacting directly to the rise in temperature caused by a fire. They are located as follows:

Living Quarters	Level 1:	7
	Level 2:	11
	Total	18

3.3.2 Each detector head transmits an electrical signal to the main alarm panel in the Production Control Room on PM-4.

3.4 Optical Detectors

3.4.1 There are three Cerberus Optical Detectors used to provide early detection of fire outbreaks. The detectors operate by sensing modulated radiation in the infrared region emanating from flames. They are located as follows:

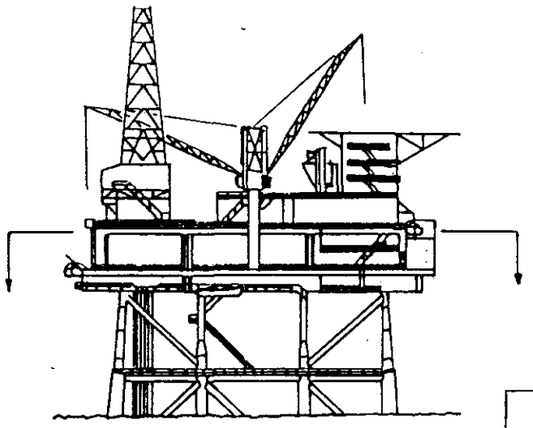
Intermediate Drilling Deck	Package 4:	2
Lower Drilling Deck	Package 3:	1
	Total	3

3.4.2 Each detector head transmits an electrical signal to the main alarm panel in the Control Room on PM-4.

3.5 H.A.D. - Fusible Plugs

3.5.1 There are 13 fusible plugs used to detect and provide early warning of fire outbreaks. The detectors operate by melting under higher preset temperatures and allowing an air pressurised loop to de-pressurise. They are located as follows:

Lower Drilling Deck	Package 6:	8
Intermediate Drilling Deck	Package 6: 2 & 9	5
	Total	13



KEY VIEW

PLATFORM NORTH N

2 OFF-MEZANINE LEVEL

BOP ACCUMULATOR UNIT

SHALE SHAKERS

DEGASSER

DESILTERS

MUD DITCH

SETTLING TANK

DESANDER TANK

POWER PACK

GM

FOAM UNIT

WAREHOUSE

COOLING PUMPS

MUD CONTAINER PL.FORM

MUD PUMP

CENTRIFUGAL MUD PUMPS

MUD TANK No 1

MUD TANK No 2

MUD TANK No 3

MUD TANK

SD

SWITCH BOARDS

CEMENTING UNIT

AIR COMP

MUD AGITATOR POWER PACK

FOAM UNIT MUD ROOM

SEA WATER TANK

FUEL TANK

POTABLE WATER TANK

MOD. 4

OD

DRUM

INDUSTRIAL WATER PUMPS

WASHING PUMP

EMERGENCY GENERATOR

SEA WATER TANK

INDUSTRIAL WATER TANK

SWITCHBOARDS

ENGINES

MECH W/SHOP

W/SHOP

ELECT WARE-HOUSE

CHANGE ROOM CONTAINER

KEY

- SD SMOKE DETECTOR
- OD OPTICAL DETECTOR
- GM GAS DETECTOR
- HEAT ACTIVATED DEVICE (FUSIBLE PLUG) HAD

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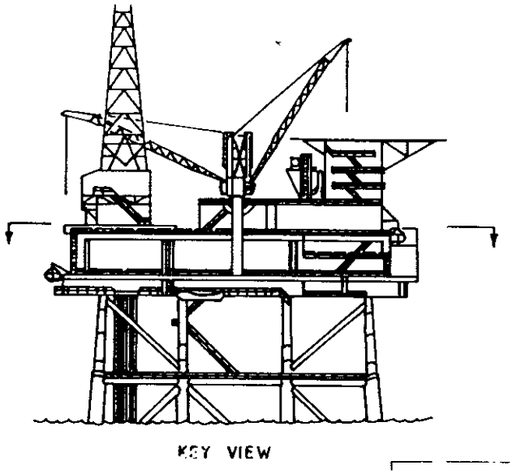
GAS AND FIRE DETECTION

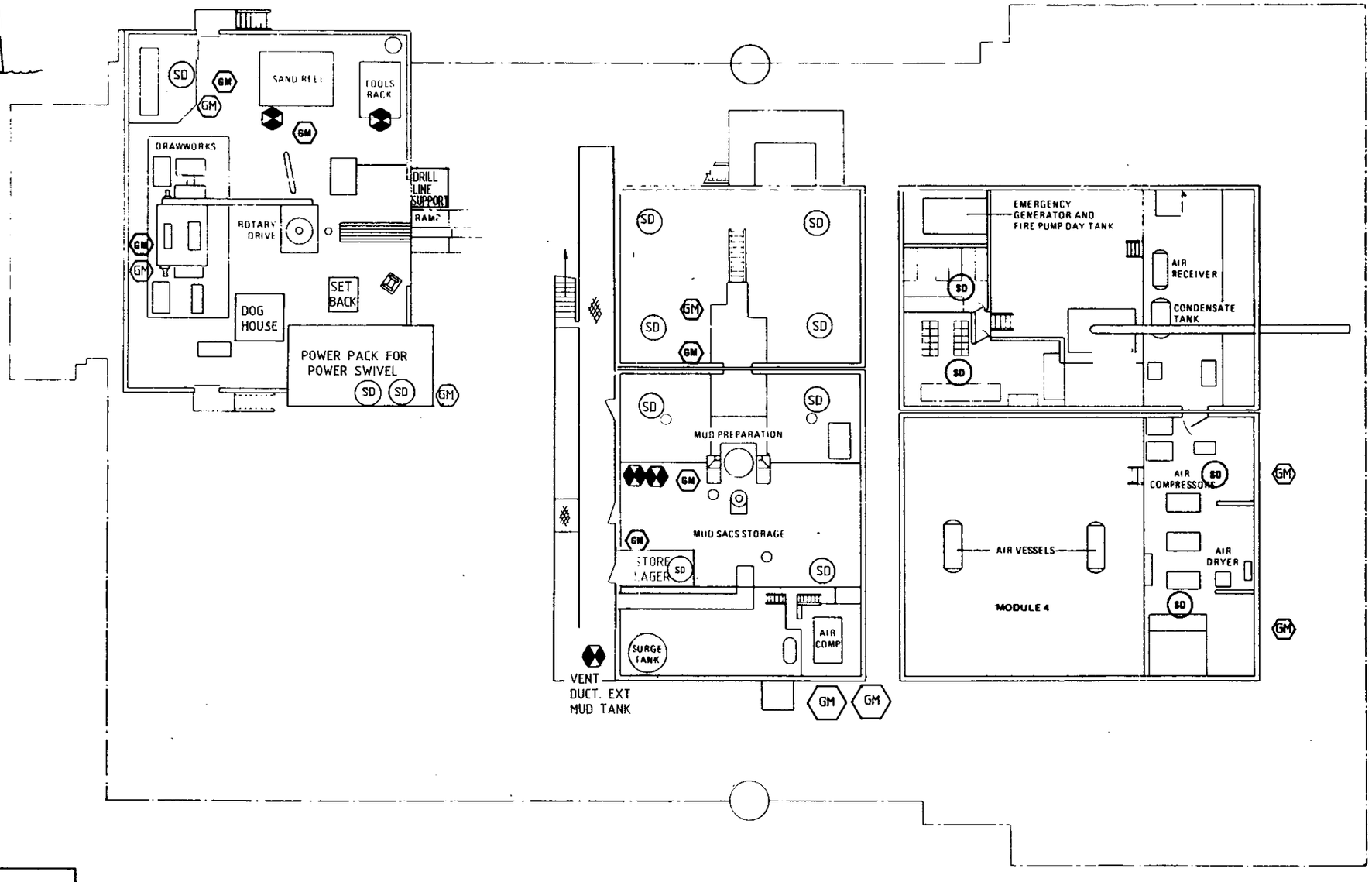
Lower Drilling Deck

4.5.1



KEY VIEW

PLATFORM NORTH N



KEY	
SD	SMOKE DETECTOR
OD	OPTICAL DETECTOR
GM	GAS DETECTOR
	HAD HEAT ACTIVATED DEVICE (FUSIBLE PLUG)

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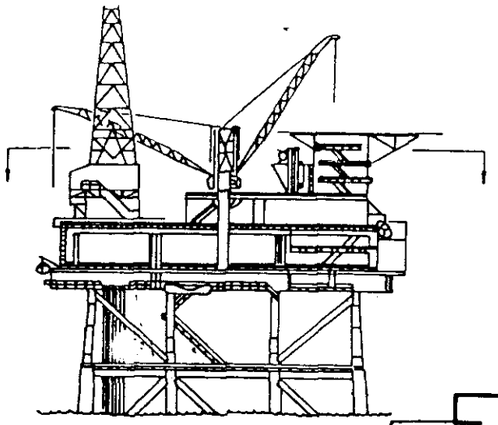
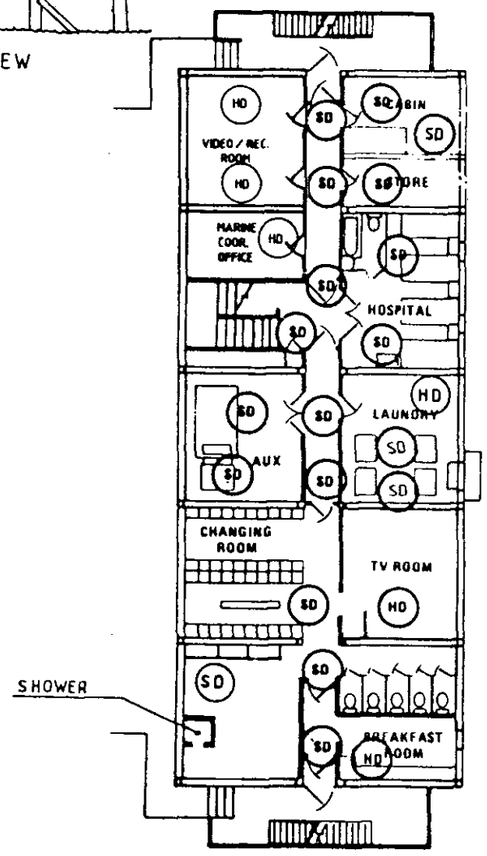
GAS AND FIRE DETECTION
Upper & Intermediate Drilling Deck

4.5.2

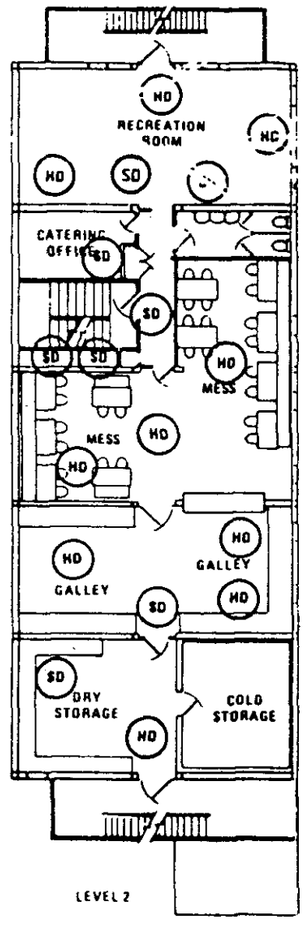


KEY VIEW

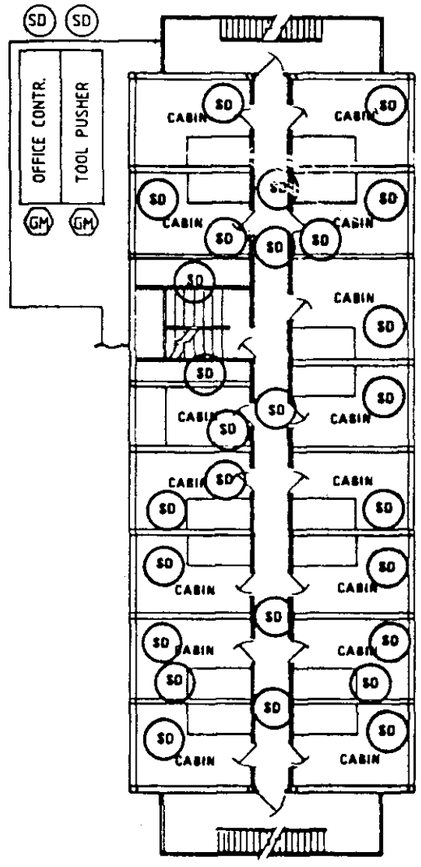
PLATFORM NORTH N



LEVEL 1

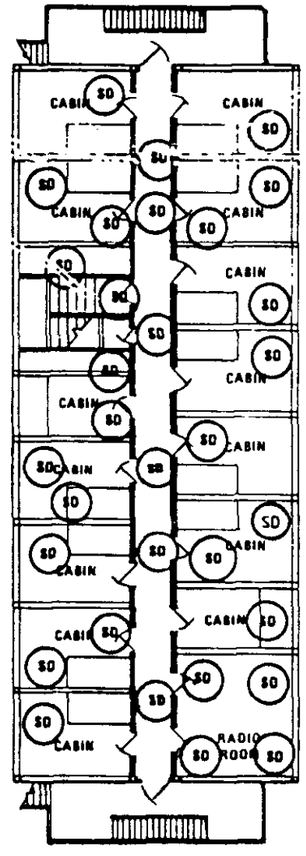


LEVEL 2



LEVEL 3

NOTE: LEVEL 3 IS 'MOTHBALLED' AND NOT IN USE.



LEVEL 4

KEY

HD THERMOVELOCIMETRIC DETECTOR

SD SMOKE DETECTOR

ISSUE 5, AUG. 1991

GAS AND FIRE DETECTION
Living Quarters

4.5.3

ELECTRICAL POWER SUPPLIES

1. GENERAL

Six generators and one ac convertor are provided for the Drilling Package; they are located as follows:

(a) Emergency generator - Leroy TA315 - Module 3

(b) Four dc generators - General Electric GE752TI - Module 4

(c) One ac/dc generator - General Electric GE752TI - Module 4

(d) One ac generator - General Electric ATI - Module 4.

2. AC GENERATORS

2.1 The main electrical supply is from the 5.5kV platform system via a 5.5kV/440V motor/generator convertor rated at 500kW, 440V, 3-phase, 60Hz.

2.2 An alternative supply is available from the diesel driven generator A1 rated at 500kW, 440V, 3-phase, 60Hz. This generator supplies the essential side of switchboard DB4.

2.3 The emergency ac generator A3 is rated at 120kW, 440V, 3-phase, 60Hz and is driven by a Baudouin 190hp diesel engine. The emergency generator supplies the 220 volt ac and 48V dc switchboards through a transformer and rectifier, and the following equipment can be supplied.

(a) The cementing unit extract fan.

(b) Submerged sea water pump

(c) Pressurising compressor.

(d) Koomey accumulator unit.

(e) Fire pump.

(f) Emergency lighting.

(g) Battery chargers.

2.4 Emergency shutdown of the generator A1 is initiated by pushbuttons located in the Engine Room near the Workshop, the Engine Room near Package 3, or at the monitoring panel on the Drill Floor. Operation of an emergency shutdown system will automatically start the emergency generator. A pushbutton situated at the Life-boat station will initiate the shutdown of the emergency generator.

3. DC GENERATIRS

The five dc generators, each rated at 900kW, 1050A at 850V, are driven by Catepillar 800 hp diesel engines. The engine used to drive generator G1 also drives ac generator A1.

4. DISTRIBUTION BOARD DB5 - SUBSTRUCTURE

DB5 can be shutdown manually from the doghouse if the following conditions prevail:

(1) The drillers workover bypass P.B. is in the bypass condition.

(2) Purge fault alarm is active.

PRESSURISATION, VENTILATION AND AIR CONDITIONING

1. GENERAL

The following packages are installed for Process, Utility and Living Quarters pressurisation and ventilation.

Mud Preparation and Pumping Areas - Packages 1, 2 & 9
Cementing Room - Package 2.
Auxiliaries Room - Package 3.
Engine Room - Package 4.
Emergency Generator Room - Package 3.
Mud Pump Room DC Motors - Package 1.
Drawworks and Sandreel DC Motors - Package 6.
Shaleshaker Area - Package 6.
Living Quarters - Levels 1, 2, 3 and 4

2. PRESSURISATION

2.1 The Cementing Room, Auxiliaries Room and Engine Room are maintained overpressurised to prevent the ingress of dangerous atmosphere.

2.2 Cementing Room

Ducted air is supplied by a supply fan through the north wall and exhausted through a duct in the east wall. The supply fan and exhaust ducting is sized to maintain a 20mmWG pressure in the room.

2.3 Auxiliaries Room

Air is supplied by a supply fan located in the north wall and exhausted by an extraction fan in the dividing wall between Packages 3 and 4. The capacity of the supply and extraction fans is such that an overpressure of 7 mmWG is maintained.

2.4 Engine Room

Air is supplied by two supply fans located in the ducting in the north wall and the auxiliaries room exhaust fan. Air outlet doors in the east wall are adjusted to maintain 1 10mmWG overpressure in the Engine Room.

3. VENTILATION

3.1 Mud Preparation and Pumping Areas

The Mud Tanks (1, 2A, 2B, 3 & 4) are ventilated by four extraction fans two located within the exhaust ducting (one standby & one duty). The external Mud Tanks 5A, 5B, & 6 are ventilated with a single extract fan located within the exhaust ducting, which is routed out on the east side of Pkg. 1 & 2.

3.2 Emergency Generator Room

Air is supplied by a supply fan through trunking in the south wall and exhausted through the west wall. The supply fan and exhaust trunking are sized to maintain a small overpressure in the room.

3.3 Mud Pump Room DC Motors

Air is supplied to the HP mud pump dc motors by four fans located in the west crane pedestal and trunked to the motors. Exhaust air is extracted through the north wall of the pump room by a single exhaust fan.

3.4 Drawworks and Sandreel DC Motors

Cooling fans are integral with the motors and ducting ensures that air is exhausted remote from the drilling deck area.

3.5 Shaleshaker room - substructure

This area is ventilated by two fans (one duty one standby) 1 located on the south wall of the shale shaker room. Also ventilated are tanks TA100 & 101 and the area below.

4. LIVING QUARTERS

4.1 General

4.1.1 With the rebuilding of the Living Quarters in 1980 the heating and ventilation system was modified. The existing air supply units S1 and S2 were retained but new ducting, trunking, fire dampers, sound absorbers and mixing units were installed. The steam heating system was removed in 1991 and replaced with an electrical heater and new control panel.

4.2 Supply Unit S.1

4.2.1 The main supply unit S1 maintains a positive pressure within the module of 6mm W.G. It operates as a 100% fresh air unit with no recirculatory air being used. Air is drawn in through an outside intake at Level 1 then filtered. A single supply fan passes the air to a two zone separation unit in which part of the air stream is drawn off in one zone outside ambient air temperature to form the cold supply whilst the remaining air in the second zone is heated to form the warm supply. Both cold and warm air streams are separately ducted to each room where they combine in mixing units, and where the ratio of warm and cold air can be adjusted to maintain comfortable levels.

4.3 Supply Unit 2

4.3.1 Supply unit 2 provides fresh air to the galley. Air is drawn in through an outside intake on Level 2, before entering the unit where it is heated and filtered, and then ducted to a central diffuser. Exhaust Fan E2 draws air from above the galley range and exhausts it outside through a throw out grill on the North side. A second Exhaust Fan E5 serves the remaining galley area.

4.4 Hospital and Laundry

4.4.1 The hospital and laundry are supplied with ventilation air from the main unit S1, but together with some toilets and offices have a separate Exhaust Fan E1 ducted to a throuw out grill on the North side of Level 1.

4.5 Accommodation Exhaust

4.5.1 The Exhaust Fans E3 and E4 mounted externally on Level 4 extract air from all levels through trunking in void spaces between partition walls and ceilings. Exhaust air from the cabins is drawn from the shower/toilet rooms so maintaining a slight negative in these areas.

4.6 Control

4.6.1 Operation of the ventilation/pressurization equipment is through a control panel with master stop/start buttons, located in the Auxiliary Room on Level 1.

4.6.2 The ventilation equipment is automatically tripped in the event that one of the following occurs:

DSD/ESD button(s) depressed
Fire in Living Quarters or Helideck (FAB or Sprinklers)
Smoke detector(s) in Living Quarter Activated
Smoke detector(s) in Technical Rooms Activated
Halon release in Technical Rooms Activated
Gas detection in area B Drilling
No air flow in ducting
Thermal trip of Fan Motor.

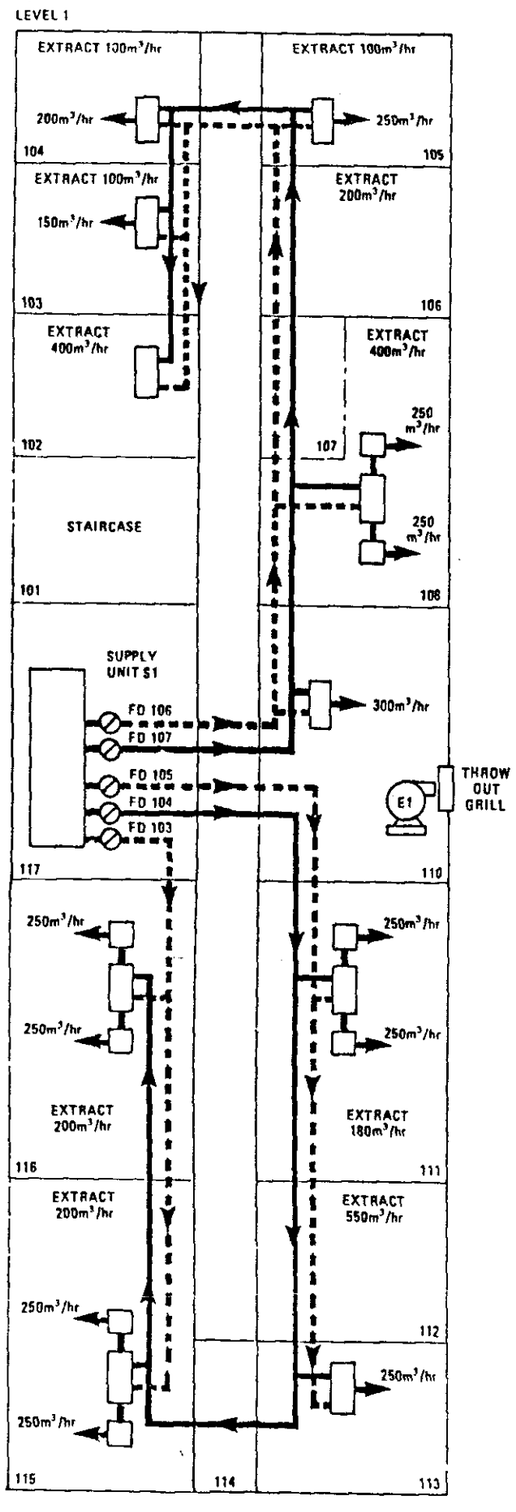
4.6.3 The fire dampers will automatically close if one of the following occurs:

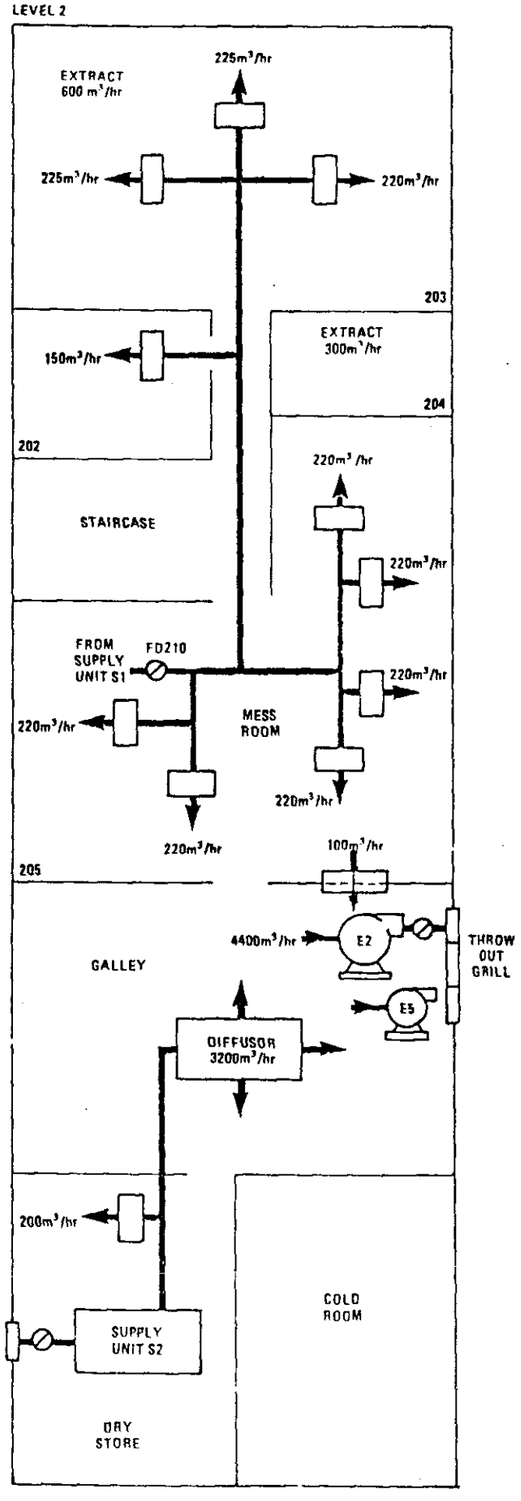
Fire in Living Quarters of Helideck (FAB or Sprinklers)
Fire Alarm in Drilling Packages 1, 2, 3. 5 or 6.
Gas Detection in area B Drilling.

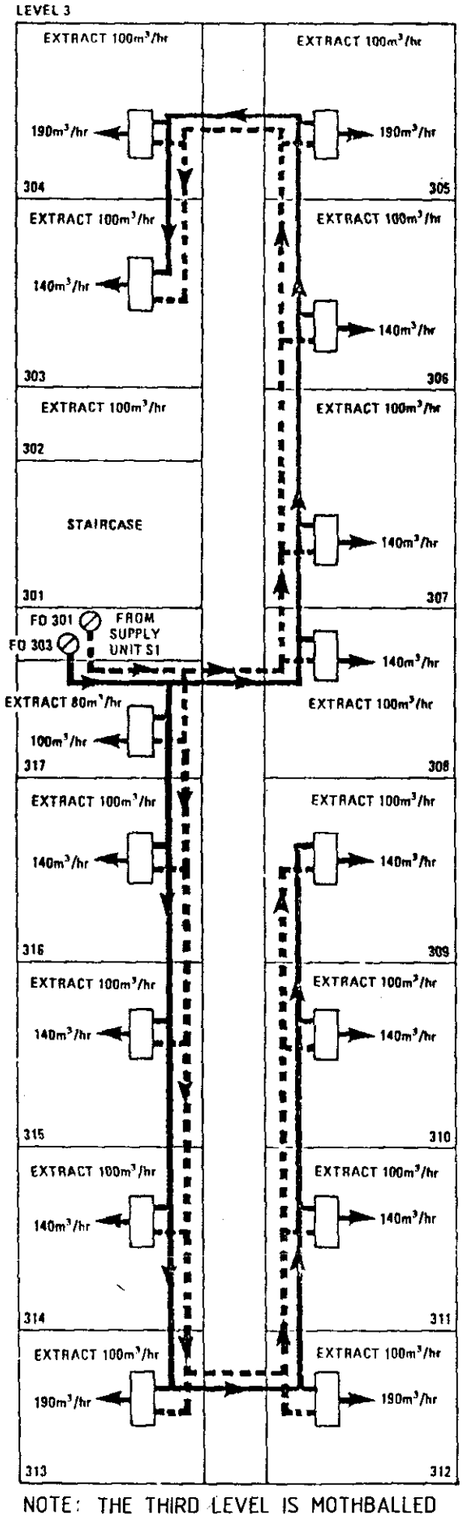
4.6.4 After a shut down the system requires manual resetting.

4.6.5 No refrigeration of the air is possible on the supply units.

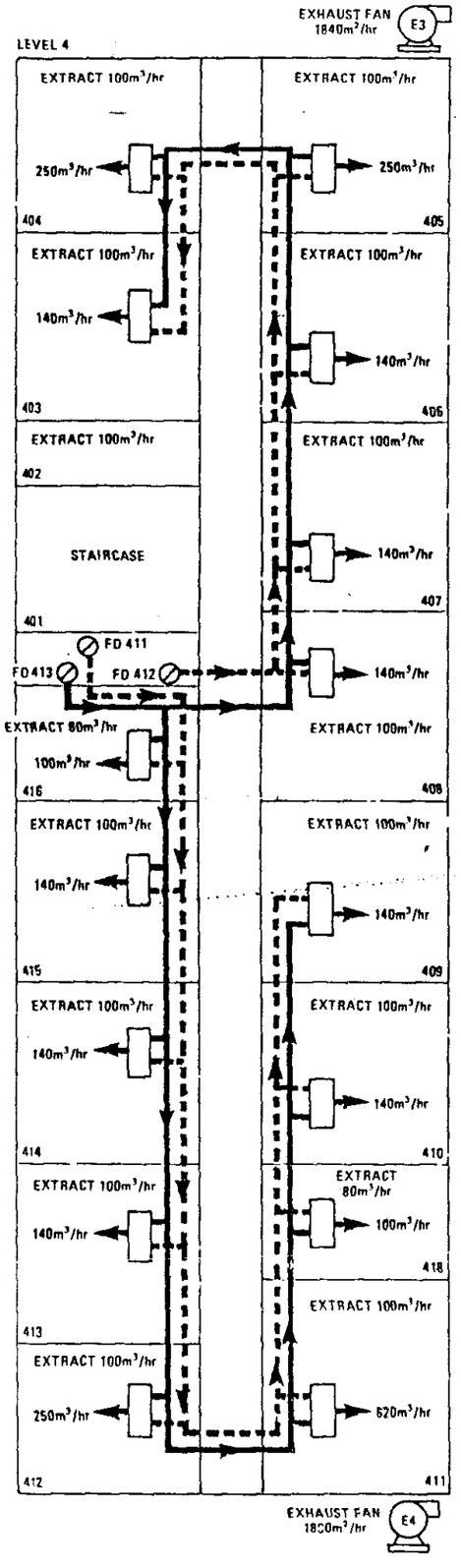
4.6.6 Overpressure in the Forex L.Q. is monitored and alarmed in the Central Control Room. This low pressure alarm is activated through a time delay to allow for normal access/departure from the living quarters.







NOTE: THE THIRD LEVEL IS MOTHBALLED AND NOT IN USE.



CHAPTER 5

PRODUCTION FACILITIES

CONTENTS

DIAGRAMS

Issue 2, Oct. 1984

GAS PRODUCTION

1. GENERAL

1.1 The twenty-four wells drilled from DP2 are grouped in two clusters of twelve. The wellheads are located in Module 1, each cluster being separated by a fire-resistant partition wall. The produced gas flows via one 26in subsea line to TCP2 for treatment.

At present the following Well configuration is valid:

- 11 wells are prepared as producers
- 1 well is being used as methanolated water injection well
- 12 wells are temporarily abandoned; plugged with a RKH 4.56 plug just below production packer, filled with approximately 20 m^3 of diesel oil and a BPV (back pressure valve) just below X-mas tree.

2. WELLHEADS

2.1 Each well is equipped with a subsurface valve (RO V201) located approximately 60m below the mud line, a remote-operated master valve (ROV202) and a hand-operated master valve.

2.2 The wellhead valves comprise a 6in wing valve (ROV203) connected to the production line, a 3in gate valve isolating the combined kill and methanol injection line, and a 6in swab valve. The wing valve is equipped with a fail-safe hydraulic actuator.

2.3 The subsurface valve is operated from a 310 bar (4500 psi) hydraulic power unit. All other remote-operated well and wellhead valves are operated from a 207 bar (3000 psi) or 103 bar (1500 psi) hydraulic power unit.

2.4 The hydraulic power units are powered by air-driven pumps operating at a pressure of 10 bar (145 psi); hand pump facilities are provided for emergency use.

2.5 Gas from the well flows through the wing valve and hence to the discharge line. On start-up, the wing valve is closed and the discharge line is pressurised via manually operated choke valve HCV 201 until the pressure across the wing valve equalises. The wing valve is then opened and the choke valve closed.

3. GAS OUTLET

3.1 Gas from active wellheads is discharged via an 8in line which incorporates measuring points for temperature, pressure and flow. These parameters are monitored and recorded in the control rooms on both DP2 and QP.

3.2 The flow from each well is controlled by a manual operated choke valve (HCV 202) in the discharge line. These choke valves are located in Module 3.

3.3 Downstream of the choke valve the line incorporates a remote-operated block valve (ROV 204), a bleed point, a check valve and a manually operated isolating valve.

For the 12 non-producing wells, a blind spade is installed by replacing the 8" check valves.

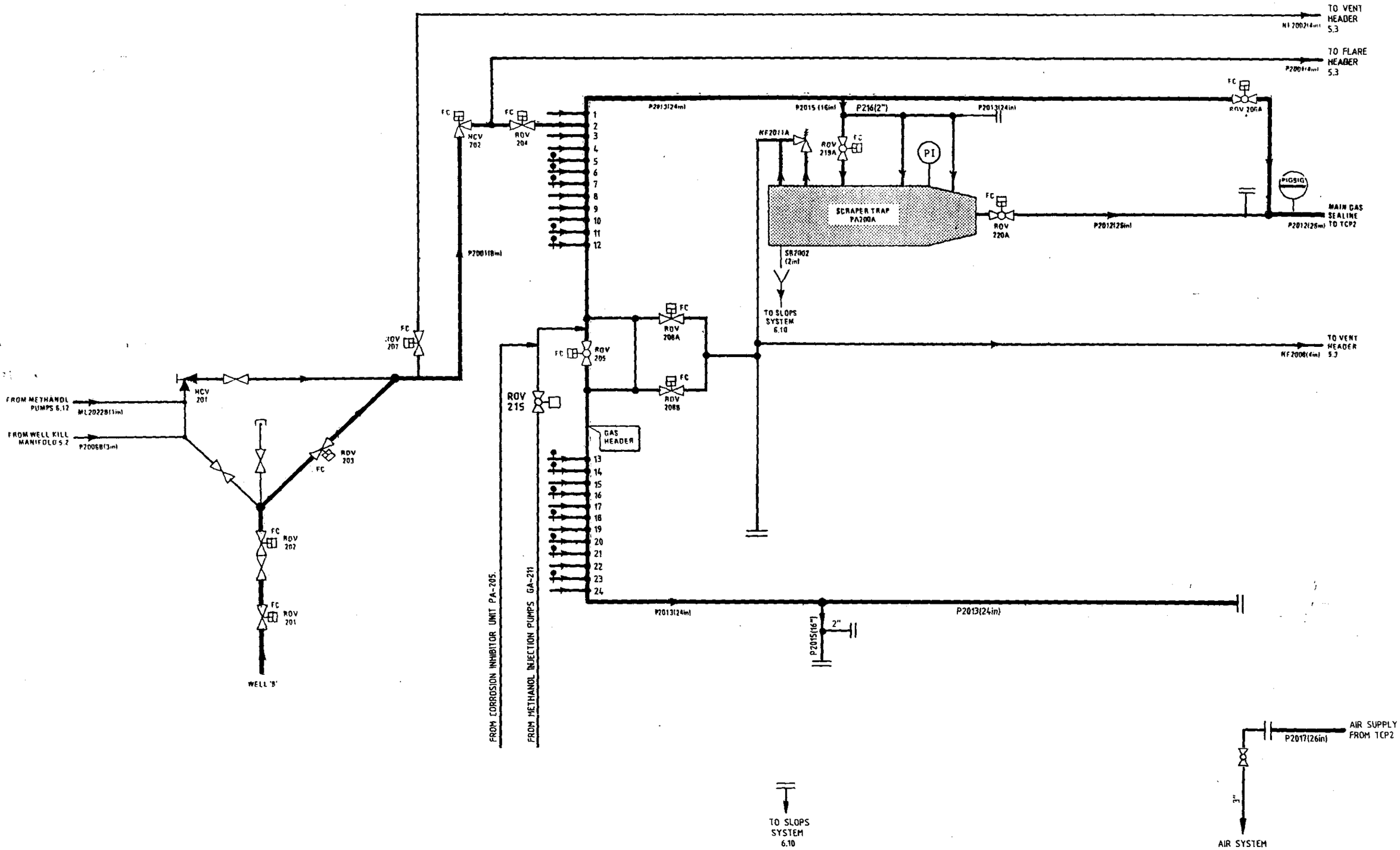
3.4 Each discharge line from the wellheads is connected to the 24in gas header which discharges into the only 26" sea line to TCP2. ROV205 installed at the centre of the gas header is normally opened so that wells from both clusters feed the sealine.

3.5 The pressure and temperature are measured for monitoring and recording in the control rooms.

3.6 Scraper pig trap PA200A is located at the entry to the 26in sea line in Module 3. The gas normally bypasses the scraper trap via ROV206, but part of the flow can be diverted through the trap via inlet and outlet block valves ROV219 and ROV 220 when pigging is necessary for line cleaning or liquid displacement.

3.7 The sea line is fitted with high and low pressure switches. Operation of either switch will result in valve ROV206A closing to shut in the sea line, and will also initiate an alarm in the control rooms. A pig signal switch is also fitted to the sea line to indicate when a pig has passed.

3.8 Provision is made to inject corrosion/bacteria inhibitor and/or methanol into the sea line. Methanol injection may be controlled remotely by the operation of ROV215. Corrosion/bacteria inhibitor injection can be controlled locally by operating a manual isolating valve.



ISSUE 2, AUG. 1991

GAS PRODUCTION	5.1

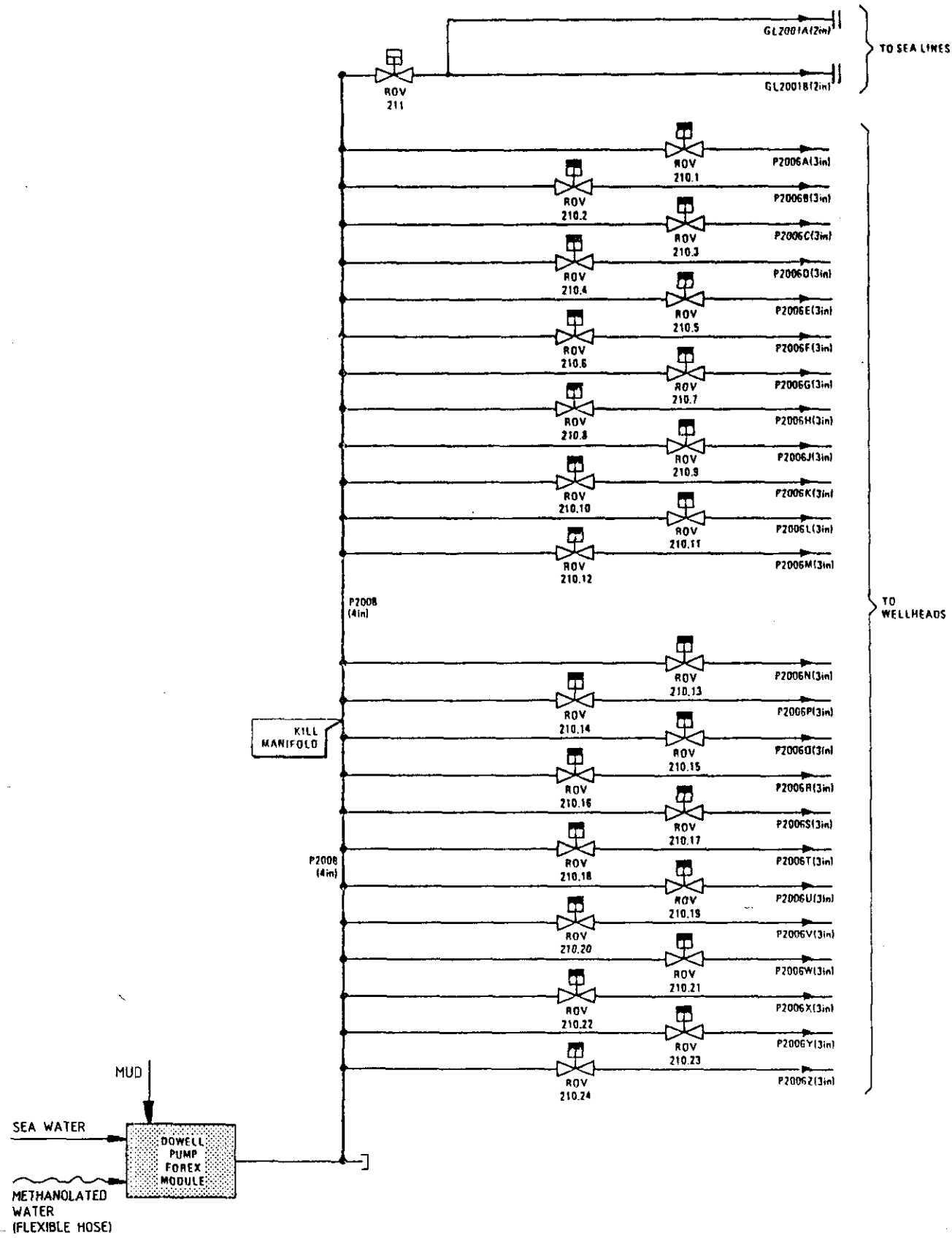
WELL KILL SYSTEM

1. DESCRIPTION

1.1 The Well Kill system is provided to conduct mud or water at high pressure to a wellhead should the need arise to kill or bullhead a well.

1.2 Mud or water is pumped from the HP pumping unit through a block valve to the 4in kill line manifold.

1.3 Three-inch lines from the kill manifold to each of the 24 wellheads are isolated by remote-operated gate valves ROV210.1 to 24.



ISSUE 2, AUG. 1991

WELL KILL SYSTEM	5.2

VENT AND FLARE SYSTEMS

1. VENT SYSTEM

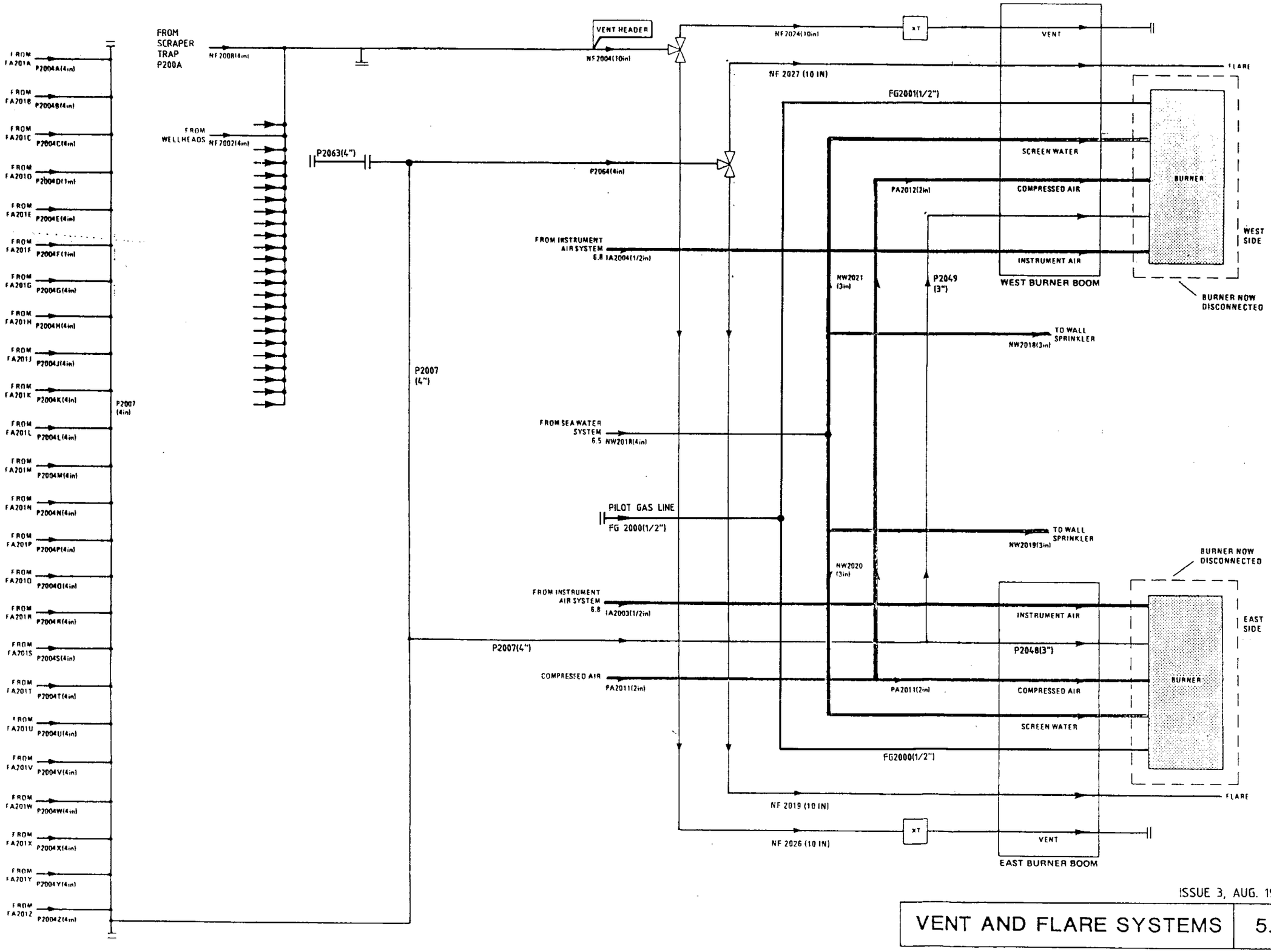
1.1 Discharge lines from equipment pressure relief devices, blowdown valves and pressure control valves combine into 10in vent header NF2004.

1.2 The header divides into two sub-headers, NF2004 and NF2026, one to each flare boom where they vent direct to atmosphere. These sub-headers are each equipped with a flame arrester and are valved to enable either to be used depending on wind direction.

2. FLARE SYSTEM

2.1 Two flares are located on booms projecting 32m from the platform on the east and west sides of Module 1.

2.2 Since the test and start-up separator is not now used, the flares are no longer operaitonal and cold venting only takes place. The Flopetrol burners are normally stored ashore and are only installed on the platform as and when required.


FROM SCRAPER TRAP P200A
NF 2008(4in)
VENT HEADER
NF 2004(10in)
NF 2024(10in)
XT
VENT
FLARE
NF 2027 (10 IN)
FG2001(1/2")
FROM WELLHEADS NF 2002(4in)
P2063(4")
P2064(4in)
SCREEN WATER
PA2012(2in)
COMPRESSED AIR
BURNER
WEST SIDE
FROM INSTRUMENT AIR SYSTEM 6.8 IA2004(1/2in)
INSTRUMENT AIR
NW2021 (3in)
P2049 (3")
WEST BURNER BOOM
BURNER NOW DISCONNECTED
TO WALL SPRINKLER
NW2018(3in)
P2007 (4")
FROM SEA WATER SYSTEM 6.5 NW2018(4in)
PILOT GAS LINE
FG 2000(1/2")
TO WALL SPRINKLER
NW2019(3in)
NW2020 (3in)
BURNER NOW DISCONNECTED
FROM INSTRUMENT AIR SYSTEM 6.8 IA2003(1/2in)
INSTRUMENT AIR
EAST SIDE
P2007(4")
P2048(3")
COMPRESSED AIR
PA2011(2in)
PA2011(2in)
COMPRESSED AIR
BURNER
SCREEN WATER
FG2000(1/2")
FLARE
NF 2019 (10 IN)
XT
VENT
NF 2026 (10 IN)
EAST BURNER BOOM
FROM FA201A P2004A(4in)
FROM FA201B P2004B(4in)
FROM FA201C P2004C(4in)
FROM FA201D P2004D(4in)
FROM FA201E P2004E(4in)
FROM FA201F P2004F(4in)
FROM FA201G P2004G(4in)
FROM FA201H P2004H(4in)
FROM FA201J P2004J(4in)
FROM FA201K P2004K(4in)
P2007 (4in)
FROM FA201L P2004L(4in)
FROM FA201M P2004M(4in)
FROM FA201N P2004N(4in)
FROM FA201P P2004P(4in)
FROM FA201Q P2004Q(4in)
FROM FA201R P2004R(4in)
FROM FA201S P2004S(4in)
FROM FA201T P2004T(4in)
FROM FA201U P2004U(4in)
FROM FA201V P2004V(4in)
FROM FA201W P2004W(4in)
FROM FA201X P2004X(4in)
FROM FA201Y P2004Y(4in)
FROM FA201Z P2004Z(4in)

METHANOLATED WATER SYSTEM

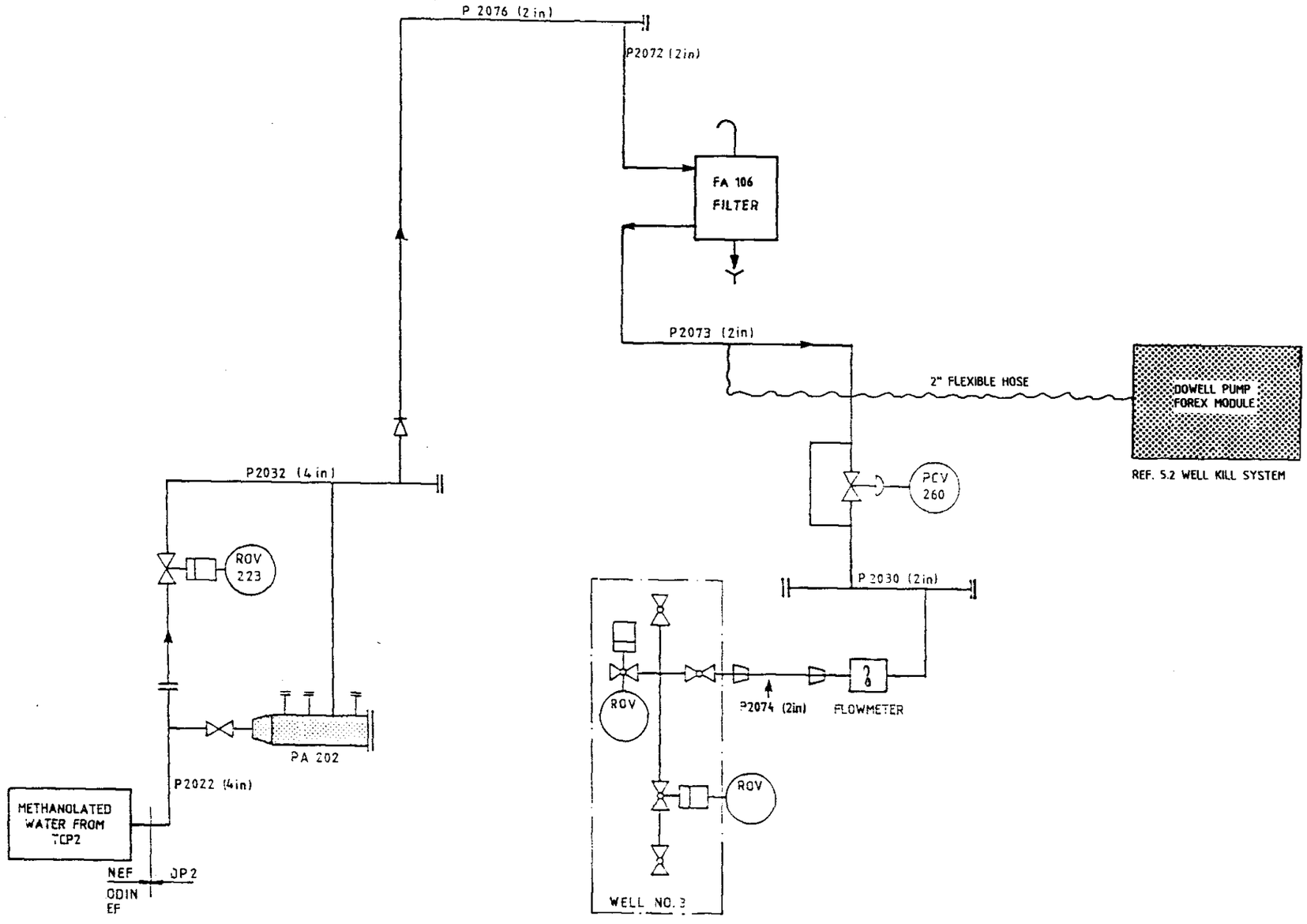
1.1 The methanolated water is flowing from TCP2 to DP2 in a 4" line, originally designed to transport well liquids from DP2 towards TCP2. The liquids arrive on the platform at a normal pressure of approx. 3 barg. It passes through a PALL filter prior to being injected into well no. 3.

1.2 Just downstream the PALL filter a pressure control valve - PCV 260 - is installed. This valve controls the backpressure in the system, and protects the upstream pipeline and sealine from having vacuum conditions due to siphoning in the downflow piping. Downstream the pressure control valve, the minimum pressure could be equal to the vapour pressure of methanolated water at 5 Deg. C which is 0.008 Bar.abs.

1.3 This pressure could also exist in the filters if the well is not shut off when the injection is stopped. The filters have, however, been designed for this minimum pressure.

1.4 In addition to the above mentioned protections, a pressure switch PSL-M 9.3 is installed on TPC2. This switch will close valve ESDV-M9.2 on TPC2 and ROV-223 on DP2, thereby isolating the sealine upon low pressure in this line (i.e. in case of a rupture in the sea line).

1.5 Occasionally, injection of methanolated water by gravity becomes difficult because of clogging in the reservoir sand. A 2" flexible hose is therefore connected downstream the filter up to the Dowell unit, thus enabling injection by pressure. This system has a capacity of approx. $15m^3/hr$.


P 2076 (2 in)
P2072 (2in)
FA 106
FILTER
P2073 (2in)
2" FLEXIBLE HOSE
DOWELL PUMP
FOREX MODULE
REF. 5.2 WELL KILL SYSTEM
PCV
260
P2032 (4 in)
ROV
223
P 2030 (2in)
PA 202
P2022 (4in)
METHANOLATED
WATER FROM
TCP2
NEF
ODIN
EF
JP2
ROV
P2074 (2in)
FLOWMETER
ROV
WELL NO. 3

CHAPTER 6

UTILITIES

CONTENTS

DIAGRAMS

POWER GENERATION AND INTER-PLATFORM ELECTRICAL CONNECTIONS

1. GENERAL

1.1 The Quarters and Treatment platforms QP, TP1 and TCP2 are joined by bridges which carry interconnecting cables. Submarine cables link TCP2 and TP1 with platforms, DP2 and FP respectively.

1.2 Under normal operating conditions power for the whole complex is generated at 5,5kV by two 13.7MW gas turbine-driven generators in the TCP2 compression area. TP1 platform has three 2.8MW gas turbine generators but these are passivated and no longer in use. Motor Control Centres on all the platforms are fed with 380V from 5500/380V transformers. Smaller diesel-driven generators on DP2, QP and TCP2 compression areas provide 380V standby supplies, (DP2) or emergency supplies (QP, TCP2).

1.3 Dual interconnections between TCP2 (compression), QP, TP1 and TCP2 (treatment) busbars are provided by 5.5kV radial feeders so that, in the event of one cable failing, power can be maintained to each switchboard. Supply to DP2 is a radial feeder from TCP2 5.5kV busbar. The Flare Platform (FP) is normally fed at 380V by a 4-wire submarine cable from TP1, but due to a malfunction of this cable, power is currently being supplied through a multicore control cable. East Frigg (EF) subsea installations are fed at 950V bu two multicore submarine cables from a dual UPS system at TCP2. North East Frigg (NEF) is fed by a 3-wire submarine cable from TCP2 5.5kV busbars via a 5.5/12 KV transformer.

Special arrangements are provided for isolating and earthing down all interconnecting cables between platforms.

2. DESCRIPTION

2.1 Generation

2.1.1 Main power is generated at 5.5kV, 3-phase, 50Hz by two gas turbines driving 13.7 MW (17.15 MVA) Stal-Laval/ASEA generators 52G01 A and B in Pancake 44. These are duel fuelled able to run on gas or diesel oil. Only one machine is running at a time and this is capable of supplying all the electrical power for the whole field. The second machine is in automatic standby position.

2.1.2 TP1 platform is fitted with three Ruston gas turbines driving 2.8 MW (3.5MVA) generators TA1, TA2 and TA3. These units are passivated and are no longer in operation.

2.1.3 The 5.5kV system is earthed throughout 17 ohm neutral earthing resistors, one for each main or standby generator.

2.1.4 52GO1 A & B are duel fuelled, running on gas or diesel. The sets normally run on gas but will automatically change over to diesel if the gas pressure falls below a predetermined level. Reversion to gas operation is manual only.

2.1.5 52GO1 A & B are air started from a discrete air system consisting of two air receivers and three small compressors. One air receiver and electric driven compressor supports each turbine. A third diesel driven compressor is used in emergency and can be used to charge either air receiver.

2.1.6 Both the main generators are capable of being synchronised and operated in parallel if necessary. Their combined fault level is 175MVA (23KA symmetrical) at 5.5kV.

2.2 Switchboards and Switchgear

2.2.1 The location of the 5.5kV switchboards making up the 5.5kV supply network are as follows:

(a) TCP2 Compression Area - Main Substation Module 32.

(b) TCP2 Treatment Area - Switchboard, Cellar Deck, Mezzanine.

(c) TP1 - Switchboard Room, Cellar Deck, Zone 06.

(d) QP - Switchboard Room L26, Lower Level.

(e) DP2 - Substation, Module 4, First Level.

2.2.2 The main 5.5kV switchgear has a design fault rating of 350MVA (37kA symmetrical) at 5.5 kV for one second but the actual fault level of the system with both main generators running is approximately 175MVA.

2.2.3 The remaining switchboards have a service rating of 800A and a design symmetrical fault rating of 290MVA (30kA symmetrical) at 5.5kV; the actual fault level is about 120MVA.

2.2.4 The circuit breakers on the boards are of the air-break type; those on the main board are motor/spring operated, the remainder are solenoid operated. The tripping and closing coils operate on a 110V dc control supply from locally situated batteries and charges.

2.2.5 The switchgear associated with switchboard DP2 5500 consists of rotary switches. These are manually closed but electrically tripped. They are suitable for fault making but only load breaking; fuses in the outgoing circuits provide protection against through faults.

3. CONTROL

3.1 Control of the whole Frigg Field electrical system is exercised from a central electrical control board in the MCC Room in TCP2 treatment areas.

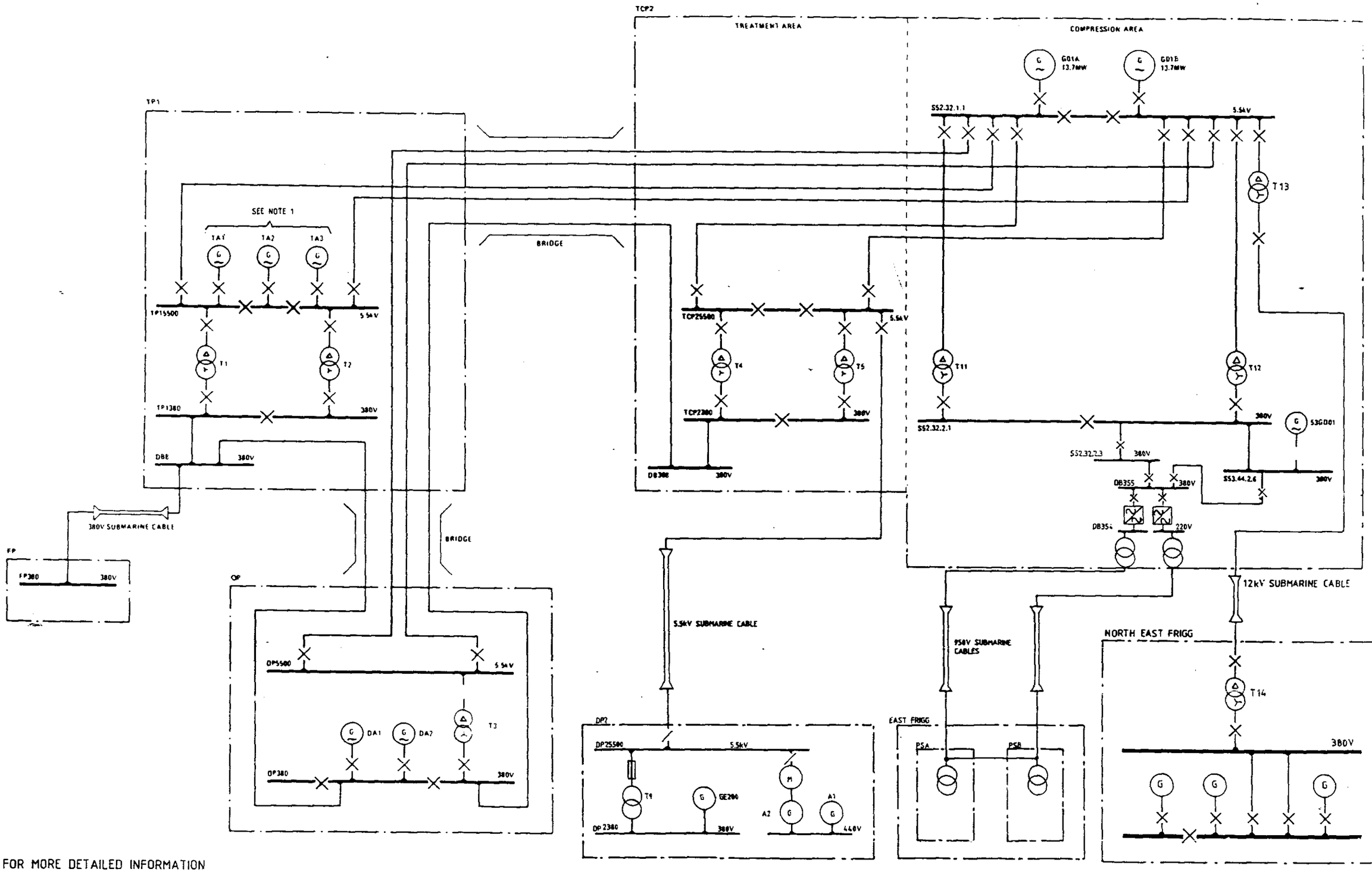
3.2 A mimic diagram on the electrical control board represents the layout of the system and discrepancy switches, set in the mimic, control the various circuit breakers remotely.

3.3 For each of the two main generator sets, a remote control unit is provided to start and stop the set and to provide the controls and indications necessary for its operation.

3.4 Synchronising of incoming generators is carried out automatically, or by manual control using a synchronising trolley at the associated switchboard. Where synchronising is carried out between different parts of the network (eg interconnector feeders) manual control at the switchgear is used. The synchronising trolley is equipped with a check synchroniser unit which permits the circuit breaker to be closed only when the frequency, voltage and phase angle of the incoming supply coincides with these values for the running supply.

3.5 Main generator set gas turbines are monitored from local control rooms located within the generator module. Each of the main generators may be controlled from remote control boards located in TCP2 treatment MCC Room.

3.6 Gas generator enclosures and gas/diesel fuel units are protected against fire by Halon systems which operate automatically or manually. Gas detection facilities are provided which will increase the ventilation rate if gas is detected, or will stop the generator if a high gas concentration is detected.



FOR MORE DETAILED INFORMATION
SEE FF00.23.00.0001

NOTE 1: GENERATORS TA1, TA2 AND TA3 ARE PASSIVATED.

ISSUE 5, AUG. 1991

POWER GENERATION AND INTER-PLATFORM ELECTRICAL CONNECTIONS 6.1

ELECTRICAL POWER DISTRIBUTION

1. GENERAL

For an overall description of power generation and high voltage distribution in the Frigg complex refer to Section 6.1

2. DESCRIPTION

2.1 5.5kV Switchgear

2.1.1 The 5.5kV input from TCP2 is fed by submarine cable and connected via A.C.B. 507 to the 5.5kV busbars. The only outputs from the busbars are to a 1000 kVA 5500/380V transformer, T7, via high rupturing capacity fuses, and an output to a 687.5kVA, 5.5kV motor via SF6 contactor. This motor drives a 440V, 60Hz,625 kVA, 3-phase generator. The cubicle switchboard is in the substation, Module 4, first level.

2.1.2 Transformer T7 is delta star connected. The secondary-winding star-point is not earthed but is brought out to a spark gap. This protects the 380V system against a breakdown of the transformer primary insulation. The transformer is a silicone oil filled type. Over temperature protection is provided.

2.2 380V Switchgear

2.2.1 The output from transformer T7 is at 380V, 3-phase, 3-wire to a 380V Motor Control Centre (MCC) through circuit breaker ACB501(B11). Two physically separate switchboards, designated MCC 'A' and MCC 'B', are permanently connected electrically. Both switchboards incorporate 380/220V transformers of 15 and 50kVA, and busbars for both voltages run through both boards. The designed fault level of the 380V switchgear is 25MVA.

2.2.2 An alternative input from the auxiliary generator through circuit breaker ACB503(A11) is interlocked with the normal input from T7 to ensure that they cannot be paralleled. No synchronising facilities are provided.

2.2.3 The MCC is located in the Motor Control Centre Room in Module 4, second level.

2.2.4 Outputs from the 380V busbars are fed via a large number of feeder panels which are equipped with either fuse-switches, fuses and contractors, or both, according to the load controlled.

2.3 220V Supplies

2.3.1 Lighting and many minor heating and power loads are fed at 220V. Distribution is by sub-boards supplied from the 380V sections through the 15 and 5.0kVA transformers mentioned above. The transformers are star-star connected and the secondary star-points are not earthed. Distribution is 3-wire at 220V line-to-line, balanced between phases.

2.3.2 The 220V feeders are controlled by miniature circuit breakers provided with thermal over current trips. They do not trip on loss of voltage.

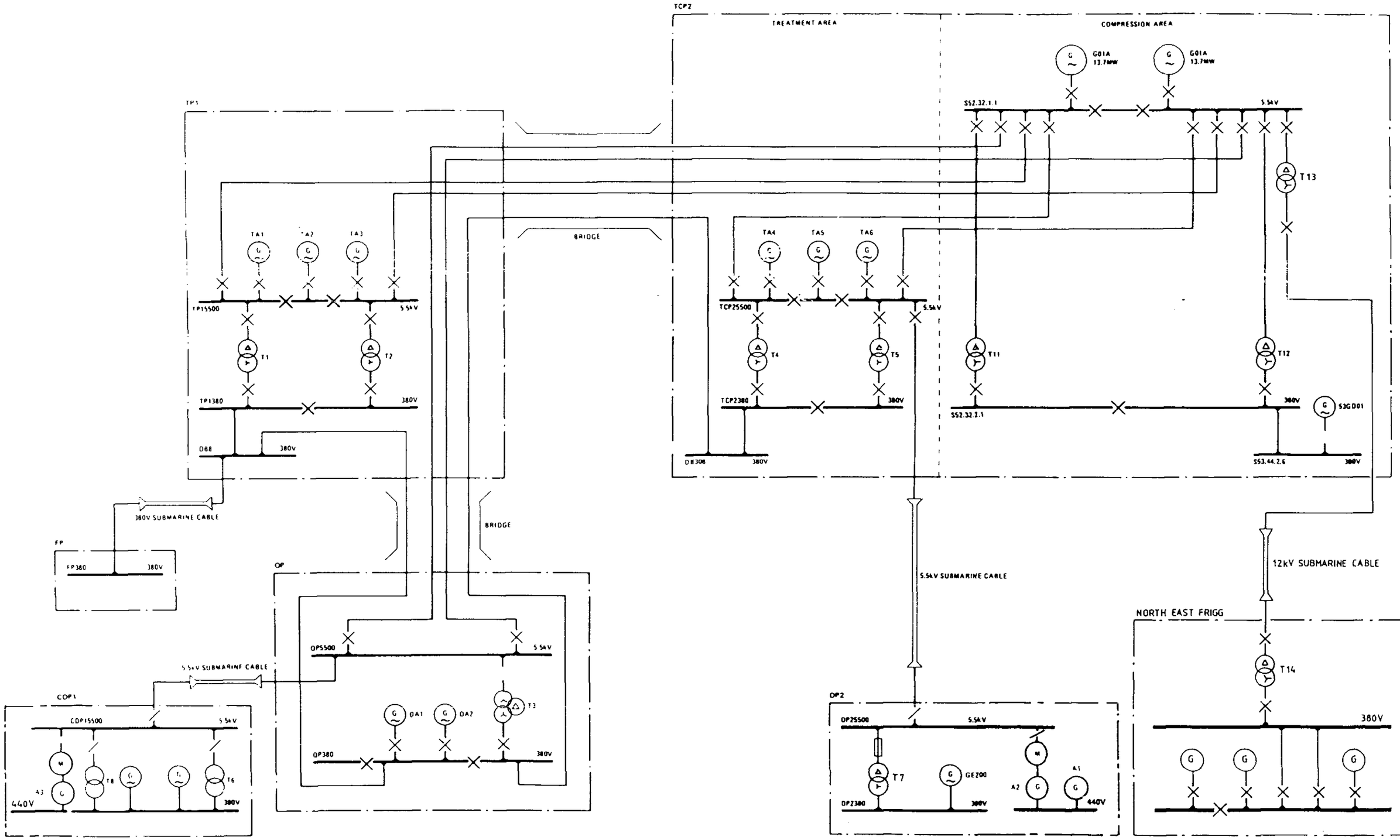
3. SYSTEM CONTROL

3.1 The 5.5kV switchboard is controlled as described in Paragraph 2.1.3 and in Section 6.1.

3.2 The 380V incomer circuit breaker on DP2 is not controlled from, but its status monitored on, TP1. Its status is also monitored on QP and on TCP2.

4. CIRCUIT PROTECTION

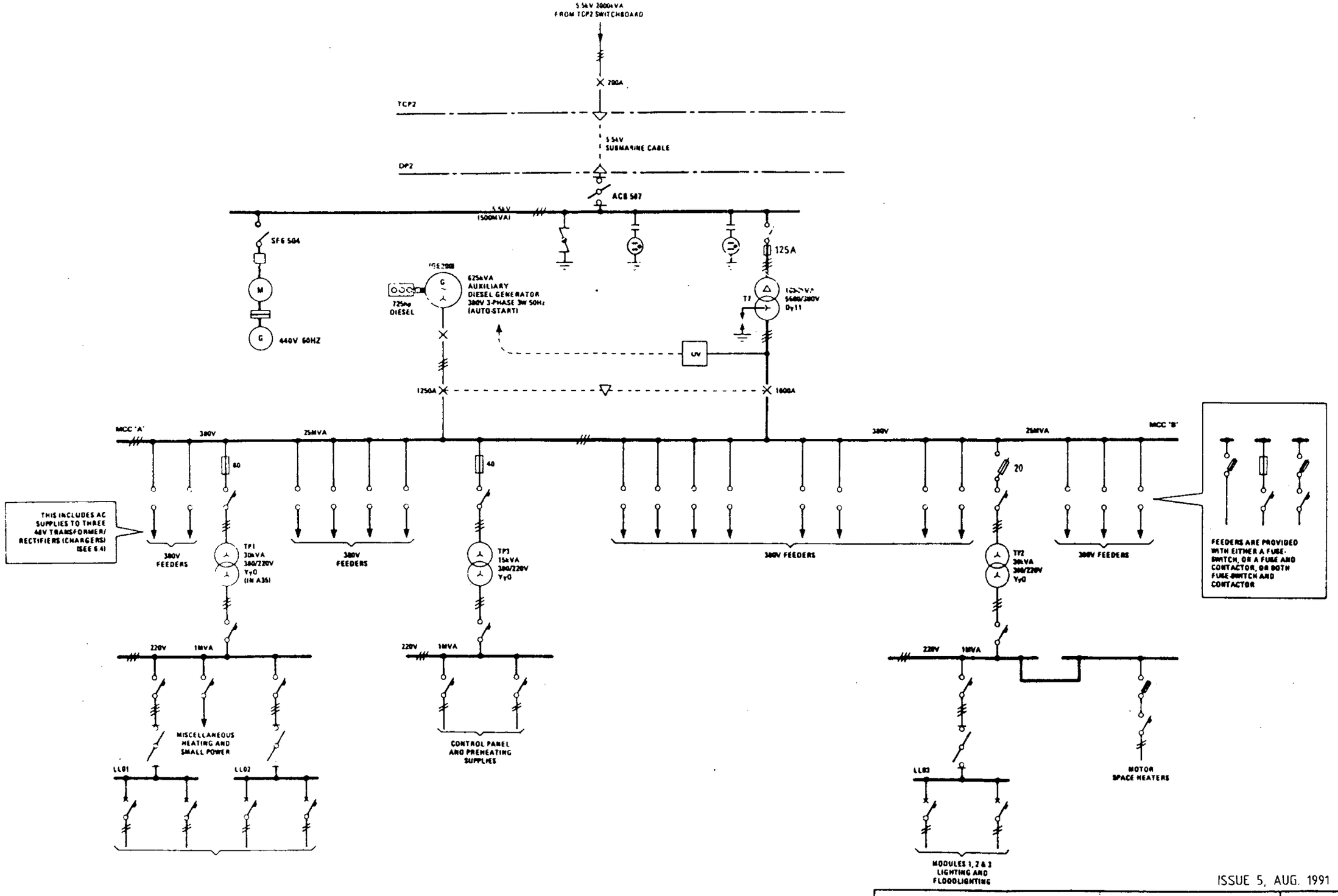
Auxilliary generator, busbar, feeder, transformer and load protection is provided by conventional means with intertripping where necessary.



ISSUE 3. OCTOBER 1984

POWER GENERATION AND INTER-PLATFORM ELECTRICAL CONNECTIONS

6.1



NOTE: FOR MORE DETAILED INFORMATION
SEE FF83.23.03.6002.

STANDBY SUPPLIES

1. GENERAL

1.1 A 500kW (625kVA) auxiliary diesel generator (GE200) is installed in Module 4 lst floor, to provide a standby supply if the normal 5.5kV supply from platform TCP2 should fail. It provides power at 380V, 3-phase, 3-wire via its local circuit breaker to MCC switchboard A and thence to B.

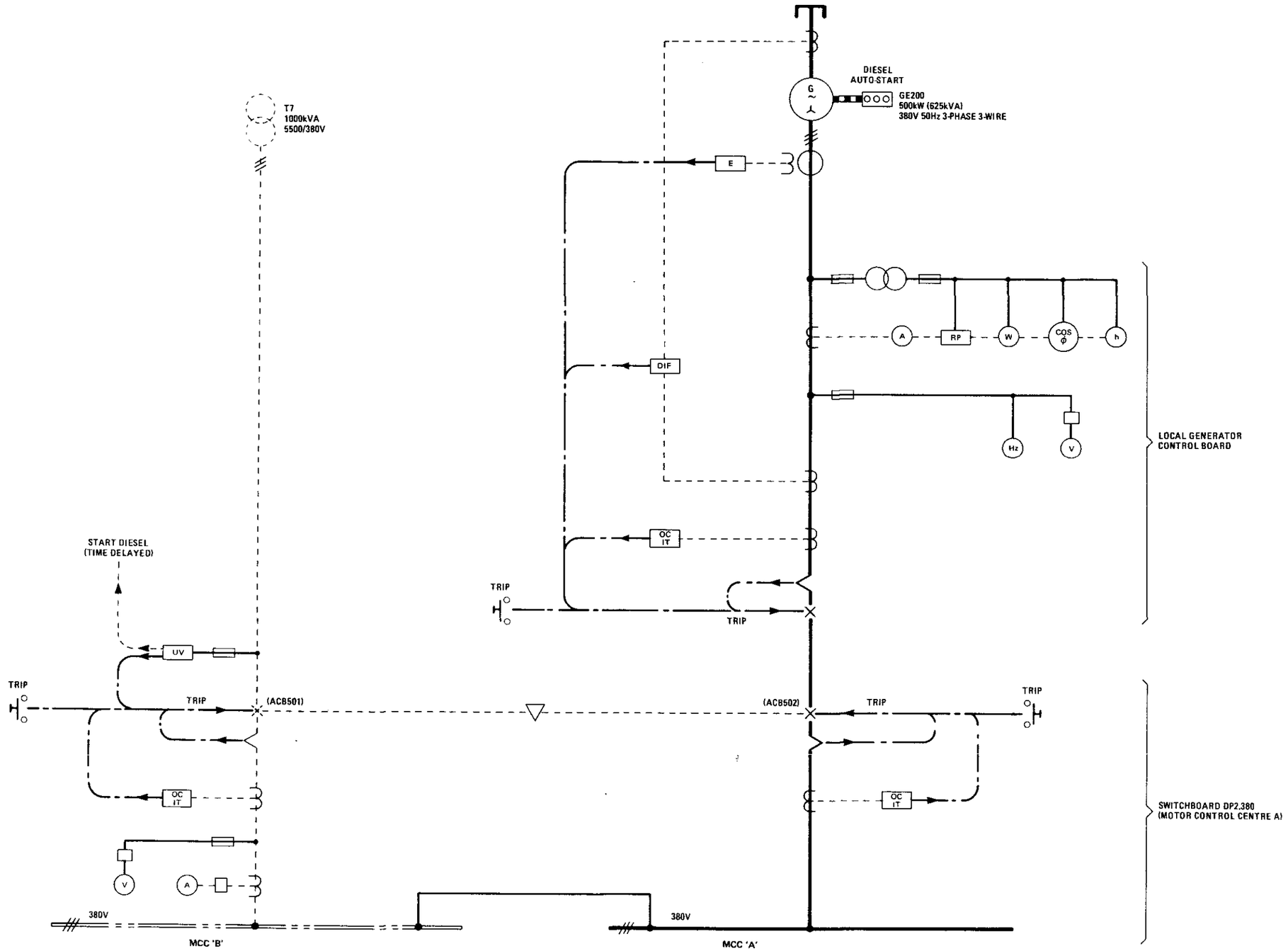
1.2 The generator star-point neutral is brought out but neither distributed nor earthed.

1.3 It is not the intention that the generator should run in parallel with the normal input from transformer T7. Therefore no synchronising facilities are provided, and active steps are taken to prevent accidental parallel operation by the provision of interlocks.

1.4 Upon loss of the normal 380V input to MCC switchboard B from T7, an under voltage relay operates to give a start signal to the auxiliary diesel generator after a short delay (to avoid "nuisance starting). When the generator has run up to speed and excited, its supply circuit breaker is automatically closed and it takes over the loads fed from MCC switchboards A and B. At the same time the transformer incomer breaker is locked out.

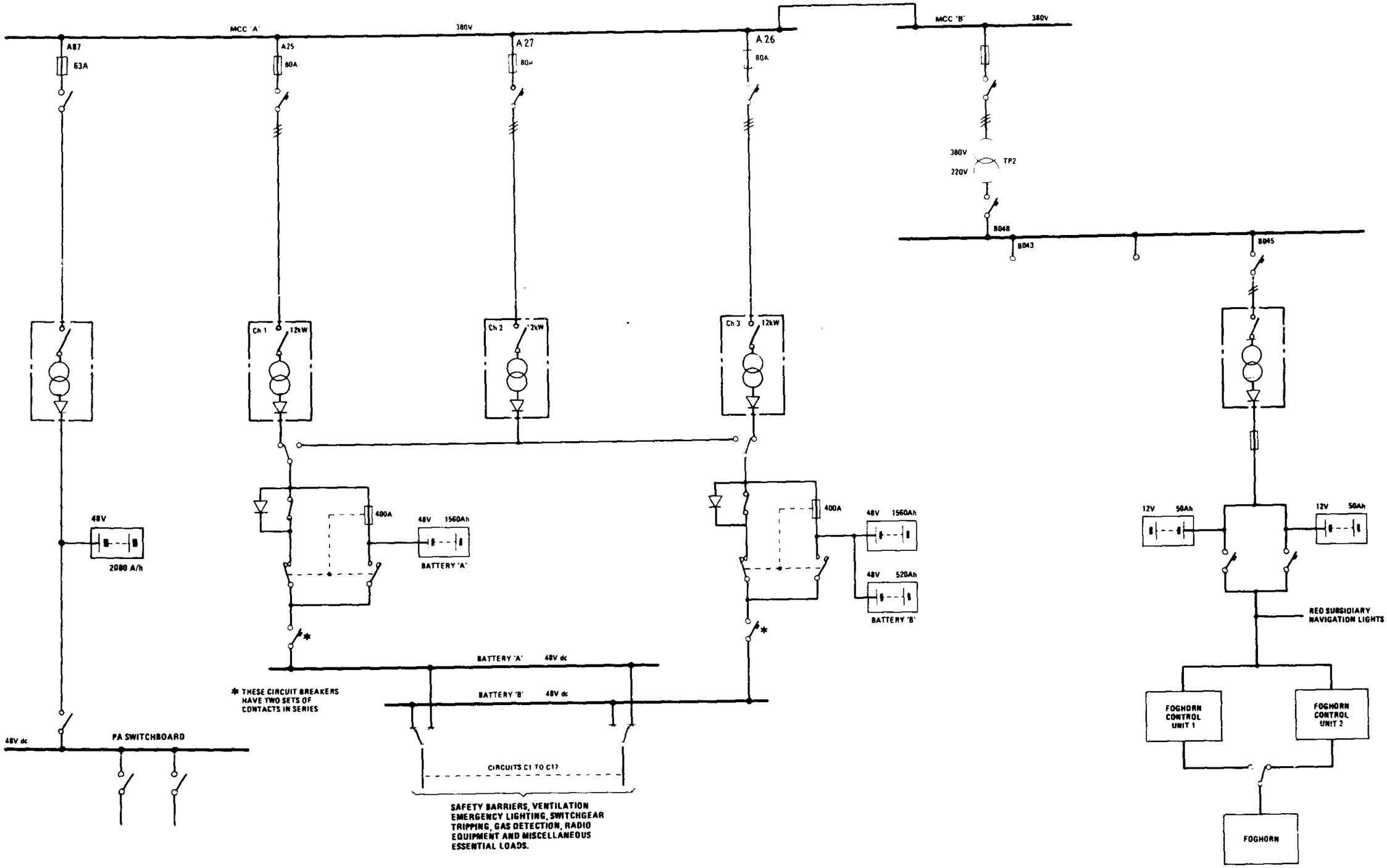
1.5 All contactor-controlled motors trip on under voltage when the normal supply is lost, so the initial load on the generator is much less than it was on the transformer. As individual motors are restarted manually the load grows, but the diesel generator is capable of taking the full load at the present time.

1.6 When the normal supply is restored, the generator circuit breaker is automatically opened to clear the interlock before the transformer incomer breaker can be closed.



ISSUE 1. OCTOBER 1980

STANDBY SUPPLIES Auxiliary Generator Protection	6.3



ISSUE 3 OCTOBER 1984

BATTERY-SUPPORTED SUPPLIES

6.4

BATTERY SUPPORTED SUPPLIES

1. GENERAL

1.1 Alternative supplies are provided on Platform DP2 for use in the event of a failure of the normal 5.5kV supply. These supplies are as follows:

(a) Standby Supplies
(b) Battery supported DC Supplies
(c) Battery supported AC Supplies

1.2 Battery supported supplies are needed for the following categories of loads:

(a) Those loads that cannot tolerate a short interruption of their power supplies.

(b) Those loads that are essential to the safety of the platform, or to the restoration of normal supplies, and must therefore be able to survive a simultaneous failure of both main and standby generation.

1.3 Some maintained supplies are used under emergency conditions.

2. DESCRIPTION

2.1 Battery supported DC Supplies

2.1.1 There are three separate battery supported dc supplies on Platform DP2. Each is fed from the platform's ac distribution system via one or more transformer/rectifiers. They are:

(a) The platform central dc supply.
(b) Foghorn supply.
(c) Public address system.

2.1.2 The platform central dc supply is derived from three identical 12kW transformer/rectifiers (chargers). Each is fed at 380V, 3-phase from Motor Control Centre switchboard A via an input circuit breaker. Unit CH1 normally feeds battery A and unit Ch2 feeds battery B. Unit Ch3 can be switched to either battery for standby purposes.

2.1.3 The outputs of the transformer rectifiers, each with a 48V nickel-cadmium battery floated across it, are fed through input circuit breakers to busbars in a dc distribution board. If a battery fuse should blow it triggers a changeover contactor so that the rectifier output is connected direct to the distribution board busbars. This action can be simulated by a Test pushbutton.

2.1.4 Tripping of any rectifier's ac input braker, or blowing of either output fuse, causes a CHARGER FAULT alarm to indicate. The pressure of an earth leakage on either dc busbar causes an EARTH LEAKAGE alarm to indicate.

2.1.5 The dc distribution board is of ironclad (explosion-proof) construction for use in a hazardous area. There are 17 output feeders, each having a busbar selector switch. Each feeder can thus be connected to either set of busbars. Also provided for each feeder. Although not illustrated, are an isolating hand operated fuse-switch and 'cut-off' contactor timing contacts. These are normally closed, but, if there is a loss of ac output from MCC switchboard A, the batteries immediately take over the dc load and the contactors start a timing sequence, opening after preset periods. Some loads are disconnected after 7 minutes, some after 1 hour and the remainder after 24 hours.

2.1.6 Exceptionally, circuit C10 (emergency ventilation) does not have a timed cut-off but can remain in operation as long as the dc distribution board is energised.

2.1.7 The foghorn supply is derived from a 220V busbar in MCC switchboard B. A single transformer/rectifier unit feeds 12V dc to the red subsidiary navigation lights and to the foghorn via alternative control units. At the same time two 12V, 50Ah batteries connected in parallel are kept trickle-charged. On failure of the ac supply the batteries take over the load without interruption and can sustain it for 4 days. An alarm is given.

2.1.8 Upon restoration of the ac supply the battery is automatically recharged while the transformer/rectifier unit resumes the load.

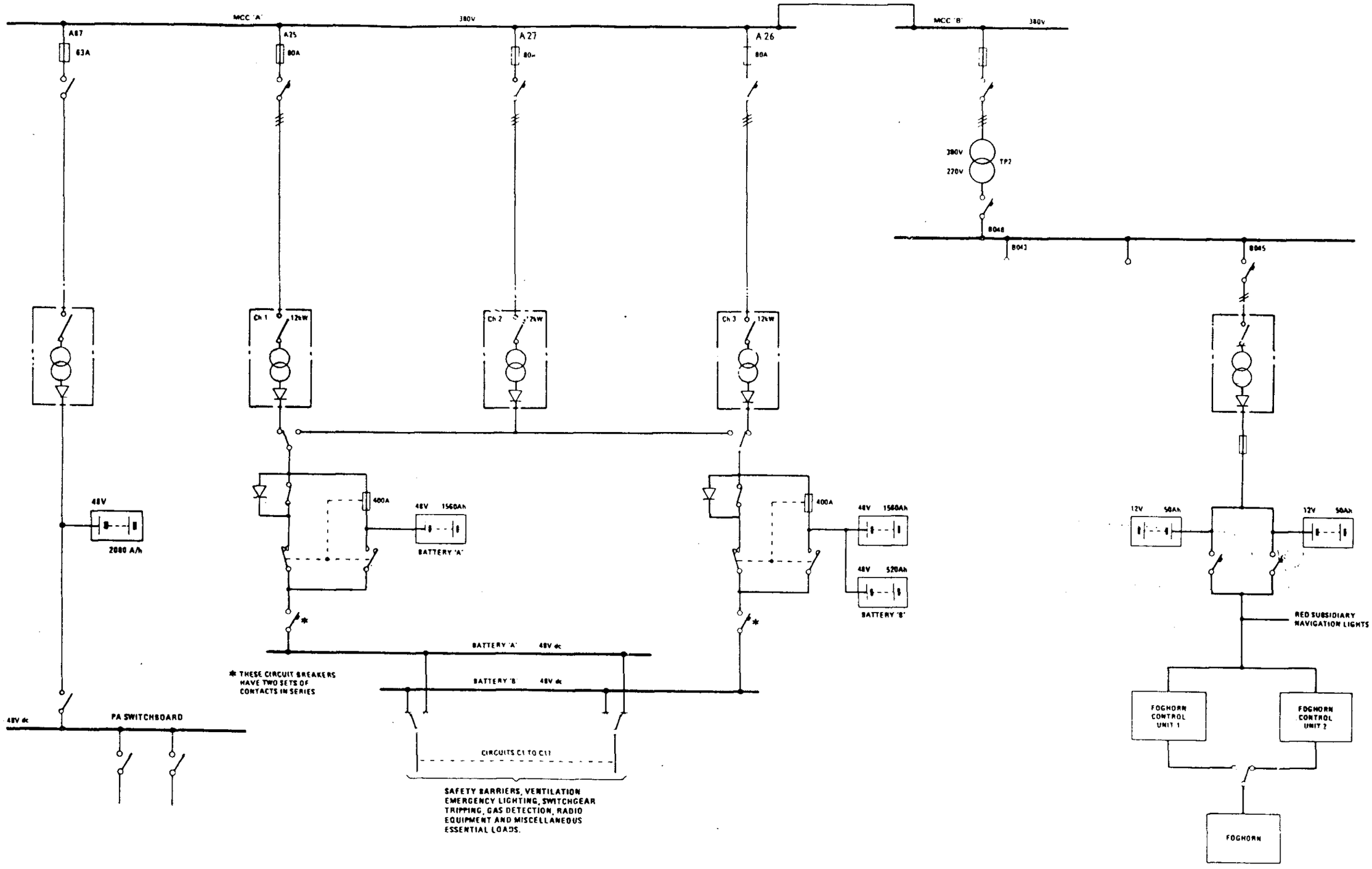
2.1.9 The public address system is fed by a 48V dc battery/battery charger floating system. This battery system is fed from MCCA switchboard and comprises a 2080 Amp/hours nickel cadmium battery bank.

2.2 Radio System

2.2.1 The 220V ac supply for the radio system is supplied by two 48V dc/220V ac convertors connected to the main 48V dc system. 220 VAC Emergency Supply Forex, and 24 V DC battery supply for Emergency transmitter.

3. LIGHTING

Reference should be made to section 10.4 for details of lighting supplied from the battery supported dc system.



NOTE: FOR MORE DETAILED INFORMATION SEE FF83.23.03.6002.

SEA WATER SYSTEM

1. GENERAL

1.1 The Sea Water System supplies sea water under pressure to the firewater ring main, flare radiant heat water screen, Module 1 wash sprinklers and to washdown hose connections.

1.2 System equipment cheifly comprises a sea water network submerged pump, a storage tank and two jockey pumps.

2. DESCRIPTION

2.1 Sea water network pump GA213 is a submerged 63kW electrically driven pump with a capacity of $140m^3/h$. The pump is located below the Pump Room at a depth of -16.5m.

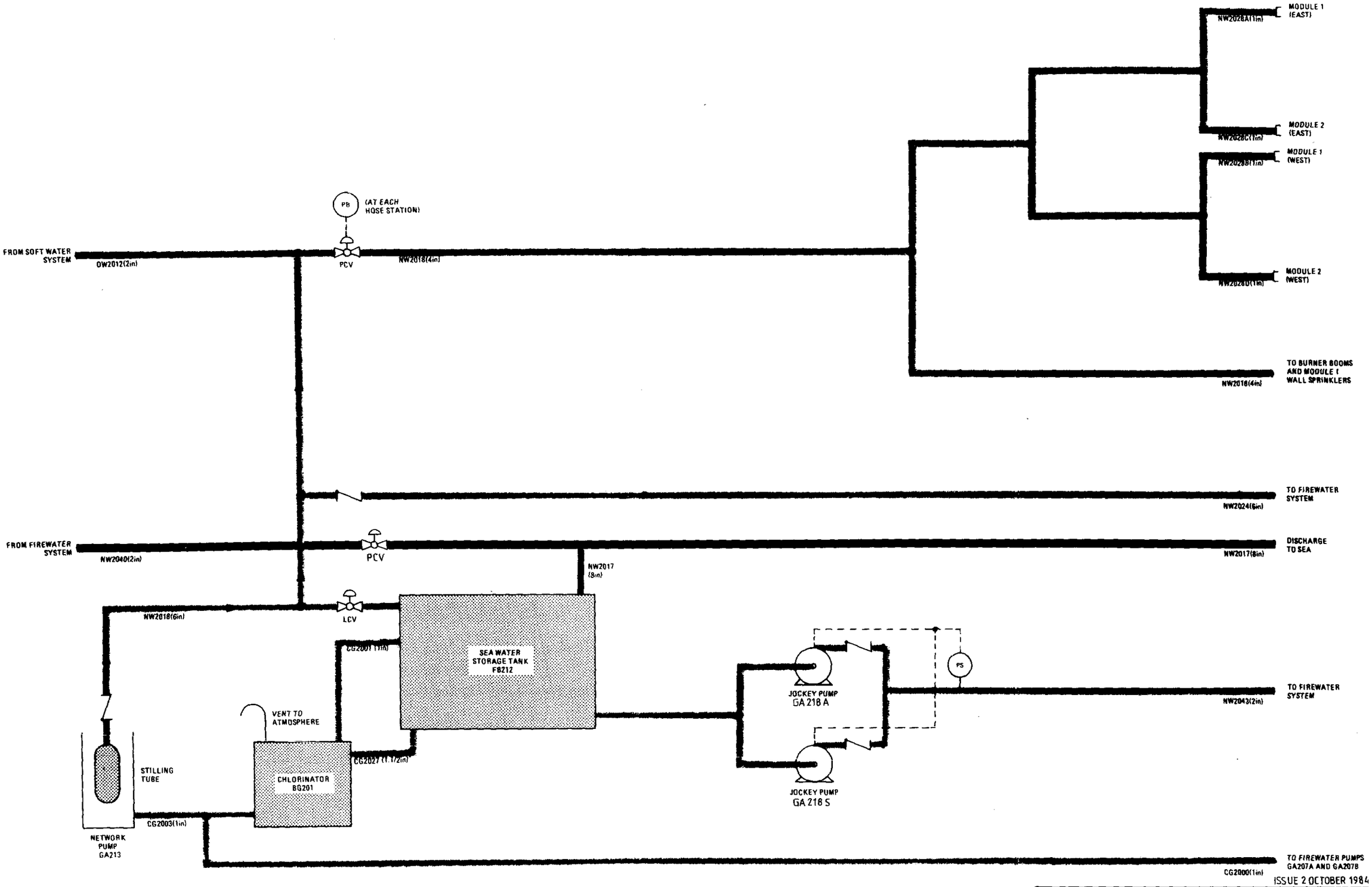
2.2 A connection from network pump GA213 allows the pump to discharge into the firewater system through a 6in line. A non-return valve in the line prevents water from the firewater system discharging into the washdown network.

2.3 Pump GA213 also replenishes sea water storage tank FB212 which has a capacity of $40m^3$ and is located on the support frame in Module 4. The pump starts and stops in response to level switches LSL 210 and LSH210 respectively.

2.4 Two centrifugal jockey pumps GA218A and GA218S, one duty one standby, each having a capacity of $2m^3/h$, take a suction from sea water storage tank FB212 and discharge into the main firewater header through a 2in line.

2.5 These pumps are pressure controlled by PS248 to maintain a pressure of between 2 and 4 bar in the firewater header.

2.6 An electrolytic chlorinator, BG201, located on the Upper Floor of Module 4, injects chlorine into sea water storage tank FB212 and into the stilling tube for network pump GA213 below the pump suction level.



ISSUE 2 OCTOBER 1984

SEA WATER SYSTEM	6.5

SOFT WATER SYSTEM

1. GENERAL

The Soft Water System is provided to satisfy the requirements of the platform's fresh water consumers. It is now interconnected with the drilling package system, and comprises two storage tanks, two centrifugal pumps, an ultraviolet treatment unit and pressurized potable water receiver.

2. STORAGE TANKS

2.1 Soft water is stored in the $160m^3$ capacity drilling package tank in Module 3. The tank is filled from a service vessel by means of flexible hoses connected at the boat landing.

2.2 From the drilling package tank water flows under level control to the second storage tank FB210 which has a capacity of $50m^3$ and is situated in the support frame below the Living Quarters in Module 4. Two kW electrical heating elements maintain a minimum water temperature of $5^{o}C$. The tank is provided with temperature and level indication. Level switches initiate alarm annunciation at tank low level and stop the duty soft water pump at extra low level.

3. SOFT WATER PUMPS

3.1 Pumps GA205A and S, situated in Module 1, provide soft water under pressure to the consumers. They are centrifugal pumps driven by 7.5kW electric motors and each has a capacity of $20m^3/h$ at a discharge pressure of 5.2 bar.

3.2 The pumps are normally run in AUTO with one duty and one standby. The duty pump will start and stop in response to switches in CH.3.0.2. The duty pump takes suction from FB210 and discharges to the drilling package hydrophore tank. The pumps can be manually controlled locally or remotely from near the pumps, from the MCC Room, or from the Platform Control Room. The operating modes are determined by the position of selector switches in the MCC Room.

4. ULTRAVOILET TREATMENT UNIT

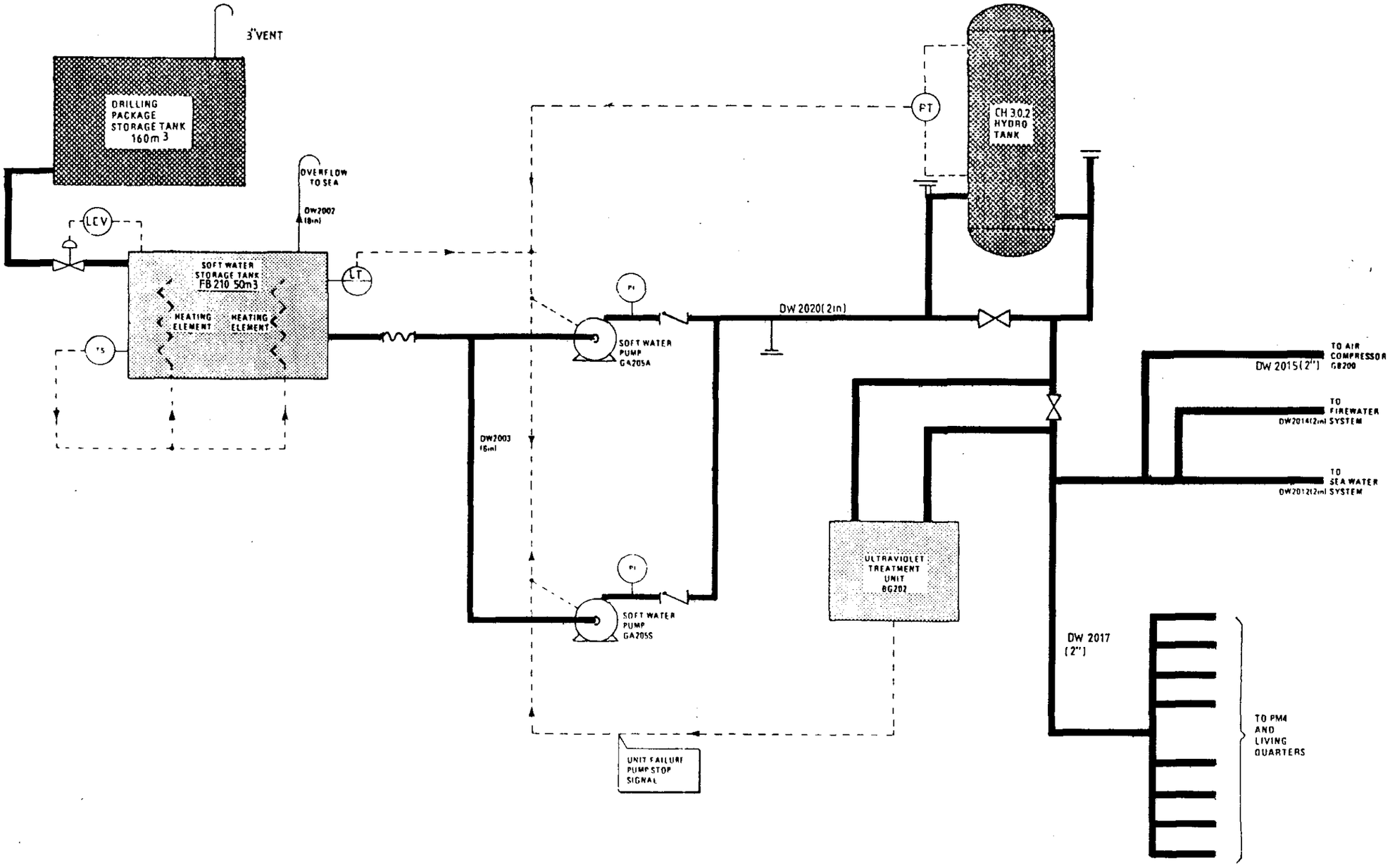
4.1 Unit BG202, located in Module 4, treats the water to make it suitable for domestic use, and has a capacity of $20m^3/h$.

4.2 Water passing through the unit is exposed to ultraviolet radiation; this sterilises the water by destroying any micro-organisms present without altering its chemical composition.

4.3 From the unit the treated water flows to the Forex/PM4 Living Quarters. BG202 can be bypassed if necessary fro maintenance or repair. A failure of BG202 will initiate an alarm and will stop the duty softwater pump.

5. SOFT WATER RECEIVER

5.1 The drilling package hydrophore tank in Module 4, serves as an accumulator. Air at nominal 2 bar pressure is supplied to the top of the vessel while the water level is maintained by level switches which start and stop the duty soft water pump.



NOTE: FOR MORE DETAILED INFORMATION SEE FF83.00.10.5000.

GAS OIL SYSTEM

1. GENERAL

1.1 The system provides the requirements of the following gas oil consumers:

(a) Auxiliary generator GE200 and Start-up air compressors GB203 and 204
(b) Fire pumps GA207A and B.
(c) Lifeboats

1.2 System equipment includes a $50m^3$ storage tank, two motor driven pumps, an emergency hand pump, two filters and three day tanks.

2. STORAGE TANK FB205

2.1 Gas oil is stored in tank FB205 located below Module 4. The tank has a capacity of $50m^3$ and is filled from a service vessel through flexible hoses and a hose connection at the boat landing. It comprises two normally married compartments either of which can be isolated for maintenance purposes.

2.2 FB205 is protected against overpressurisation by three safety valves, each set to relieve at 15mbar, and all led to atmosphere, together with an atmospheric vent line incorporating a flame trap.

2.3 The temperature of the tank contents is maintained at a minimum of 5^{o} C by means of two 6kW heating elements. The temperature is indicated locally.

2.4 A level switch initiates the following:

(a) An audible alarm at the filling position and a visual alarm at the control panel at high level.
(b) Visual alarm at the control panel at low level.

2.5 A 2in line is provided to drain the tank down to slop pump GA204 which discharges to the unloading station hose connection.

3. GAS OIL PUMPS

3.1 Two 1.1kW motor driven positive displacement gas oil pumps GA201 A and S located in the Pump room below Module 4 take a suction from the storage tank. The pumps operate one duty and one standby, and each has a capacity of $2m^3/h$ at a discharge pressure of 3.3 bar. Duty/standby selection is via a Normal/Emergency selector switch in the MCC Room.

3.2 A hand pump, GA 202, is provided for initial start-up only, to supply auxiliary generator day tank FB202. The hand pump can deliver 900 litres/h when worked at 80 strokes/min.

4. FILTER UNITS

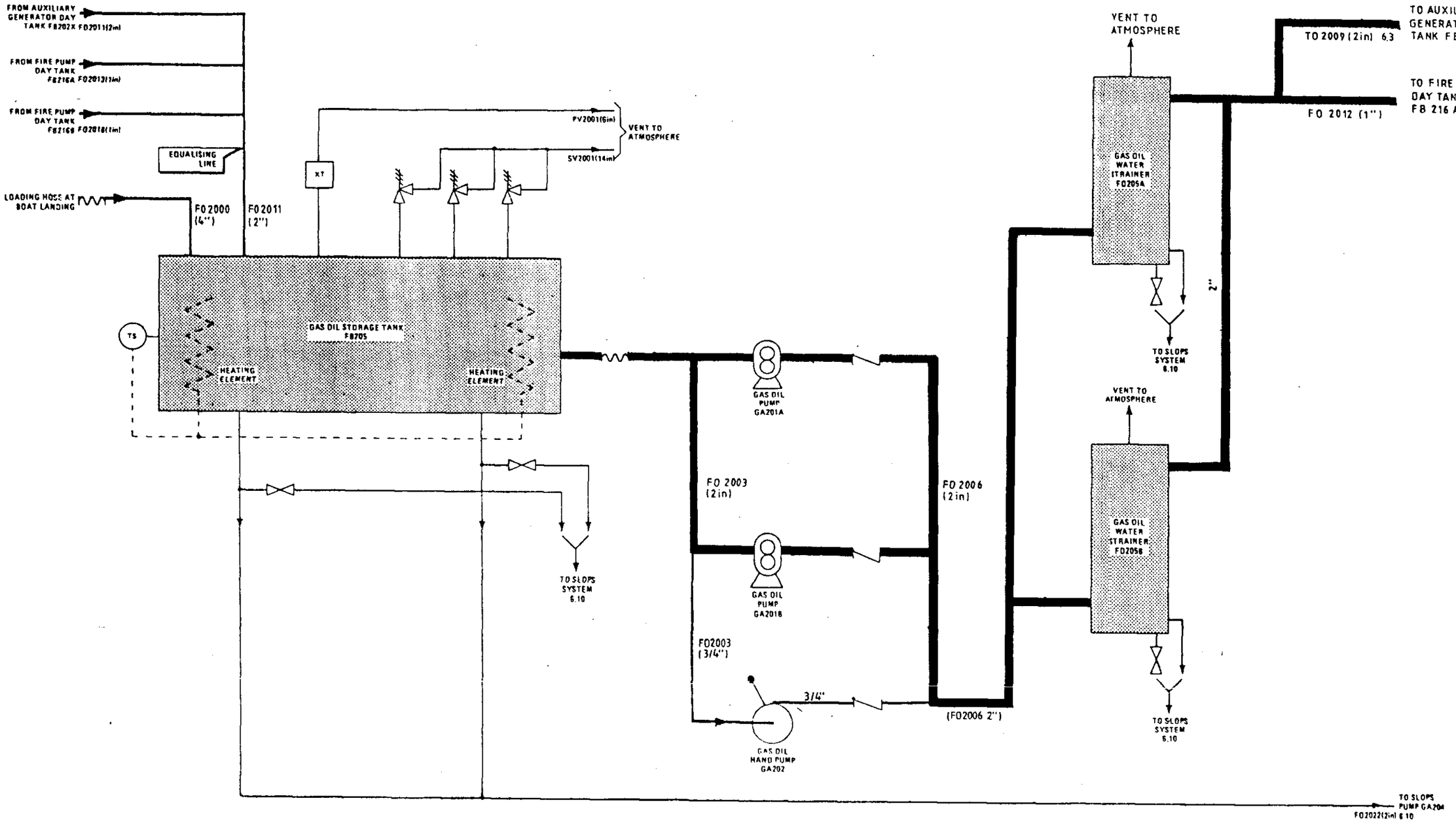
4.1 The gas oil pumps discharge to the gas oil day tanks through one of two water strainers FD 205 A or B. These filters are provided to remove particles down to 5 micron size and to remove entrained water. Water gathered in the bottom of the unit is discharged into the slops system through an integral automatic drain trap. This water can also be evacuated manually.

4.2 Air or gas collected in the top of the unit is automatically released to atmosphere.

5. CONTROL

5.1 The pumps operate in response to level switches linked to level control valves, one for each of the day tanks FB202X and FB216 A and B. Should the level switches fail to stop the pump and close the valves, the day tanks can overflow to storage tank FB205 through 2in equalising line F02011. This line also carries the spill from the fire pumps' fuel systems.

5.2 The pumps can also be controlled manually from four sets of On/Off pushbuttons, one set next to the pumps, one in the MCC Room, one in the Platform Control Room and the fourth in QP Control Room. The first two sets are operational with the Local/Remote selector switch in the MCC Room set to LOCAL, the other two with the switch set to REMOTE.



NOTE: FOR MORE DETAILED INFORMATION
SEE FF83.00.12.5027.

COMPRESSED AIR

1. GENERAL

1.1 Dry air at 10.5 barg is supplied from TCP2 via the 26" sea line B (R2). The sealine is at the same time acting as an air reservoir, together with the two TP1/CDP1 sea lines.

1.2 The supply line is tied in to existing system downstream the old air dryers, but upstream the two plant air receivers FA203 A and B, located in Module 3. Each receiver has a capacity of 3500 litres and is protected from overpressurisation by relief valves set to lift at 12.6 bar. A pressure switch installed in the 2in common discharge manifold initiates alarms on high or low pressure discharge from the receivers.

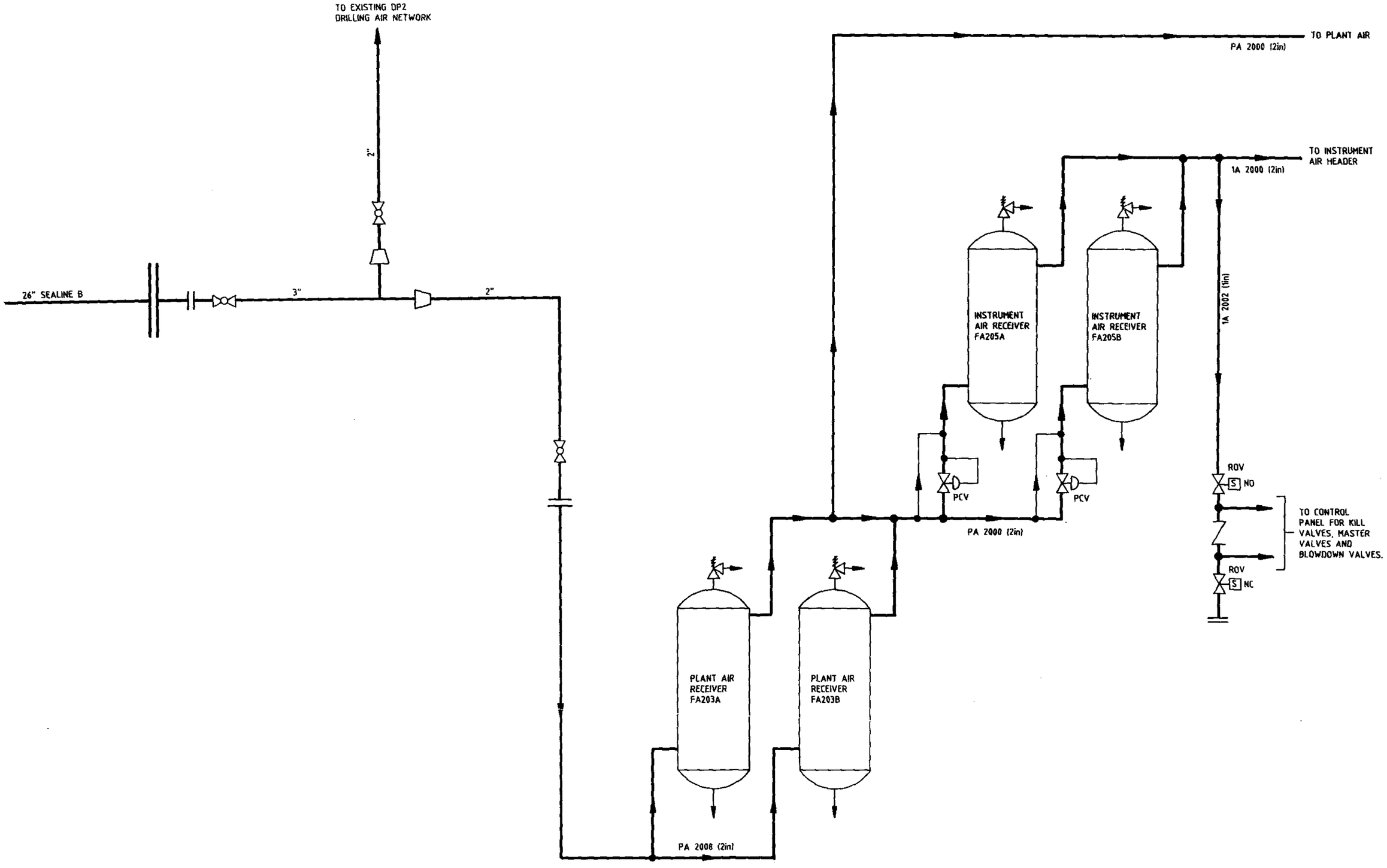
1.3 Plant air is drawn from the receivers by the workshop utilities in Module 4 and by the two hydraulic power units located in Module 3 through a 2in line. Hose connections are provided for tappings from the plant air system in all modules.

1.4 Pressure control valve PCV242 reduces the plant air pressure to 2 bar for supply to potable water receiver FA211.

1.5 Air from the plant air receivers passes through pressure control valves PCV240 and 241 to instrument air receivers FA205 A and B, located in Module 3. Pressure control valves PCV240 and 241 reduce the plant air pressure to 3 bar before it passes into the receivers. Each receiver has a capacity of 300 litres and is protected from over pressurisation by relief valves set to lift at 3.8 bar.

1.6 Instrument air from the receivers passes to distribution points on all modules and to the burner booms. A supply of instrument air is also provided for the wellhead valve control panel through a 1in line.

1.7 A 2" interconnection line between the process and drilling rig air systems is installed. Normally air is supplied from TCP2 to the drilling air system. However, one compressor, the diesel driven MAT501 compressor, is still operative, enabling pressured air to be supplied from drilling rig air system to process system.


TO EXISTING DP2
DRILLING AIR NETWORK
2"
26" SEALINE B
3"
2"
TO PLANT AIR
PA 2000 (2in)
TO INSTRUMENT
AIR HEADER
1A 2000 (2in)
INSTRUMENT
AIR RECEIVER
FA205A
INSTRUMENT
AIR RECEIVER
FA205B
1A 2002 (1in)
PCV
PCV
PA 2000 (2in)
ROV
S NO
TO CONTROL
PANEL FOR KILL
VALVES, MASTER
VALVES AND
BLOWDOWN VALVES.
ROV
S NC
PLANT AIR
RECEIVER
FA203A
PLANT AIR
RECEIVER
FA203B
PA 2008 (2in)

VENTILATION SYSTEMS

1. GENERAL

1.1 The platform is provided with three types of ventilation:

(a) Natural - exposed to the atmosphere.

(b) Force Vented - where air is drawn in from a safe area in addition to that provided by the pressurisation system.

(c) Pressurised - where the air is supplied by a fan so that the pressure inside a room is greater than that of the surrounding atmosphere, thus preventing the ingress of dangerous gases or contaminated air. Excess air is discharged to atmosphere via dampers or by extractor fans.

Modules 1, 2 and 3 are naturally vented. Module 4 is air conditioned and pressurised. Separate air conditioning systems supply conditioned air to the Living Quarters and Technical Rooms.

1.2 Design criteria for the heating, ventilation and pressurisation equipment in Module 4 are as follows:

(a) Climatic conditions:

(i)	Summer -	Outside:	+21.6^{o}C at 80 per cent relative humidity
		Inside :	+22+ ^{o}C at 55 per cent relative humidity
(ii)	Winter -	Outside:	-8.8^{o}C.
		Inside :	+22^{o}C in Living Quarters and Technical Rooms on the Instrument Room on the First floor. +5^{o}C in Technical Rooms on the First Floor.

(b) Recirculation rate: 30 per cent

(c) Average fresh air volume per person: 25m^{3}/h

(d) Overpressure in the quarters: 6 mmWG.

2. DESCRIPTION

2.1 PM4 Cabins & Recreation Room.

2.1.1 Air conditioning is provided for the Cabins & Rec. rooms by two centrifugal fans, AC1 and AC3. The fans will normally run with AC1 as duty and AC3 as standby.

2.1.2 Incoming air may be pre-warmed by a 12kW heater then further warmed by zone heaters. The zone heater for the cabins is rated at 12kW, and that for the rec. room is rated at 6kW. A humidifier is provided for use when the heating is on. The humidifier capacity is 9kg/h of water.

2.1.3 Incoming air may be cooled and dried in the air conditioning unit located downstream of fan AC1. Conditioned air serves to pressurise the cabins and rec. room.

2.1.4 Air is naturally vented from these rooms through louvred doors into the second floor corridor. A portion of this air is recycled through the airconditioning system, the remainder being extracted by the sanitary exhaust system or discharged to atmosphere through a louvred outlet at the end of the corridor.

2.2 Coffee Room

2.2.1 Ventilation of the Coffee room is provided by fans AF1 and AF2, normally running one duty and one standby. These fans ensure a fresh air flow into the room of 25 air changes per hour. When required, the air may be heated by a 6kW heater to $+15^{o}C$.

2.2.2 A locally controlled axial flow fan, AV2, is fitted into the Galley hood and is capable of extracting 60 changes of air per hour. The hood is equipped with grease filters and a fire damper.

2.3 Technical Room Ventilation

2.3.1 Air conditioning for the Technical Rooms is provided by two centrifugal fans, AC2 and AC4. AC2 is normally duty, and AC4 standby. These fans share a common inlet duct with fans AC1 and AC3. Incoming air may be pre-warmed by a 36kW heater then further warmed by zone heaters located in the ducts to each room. Incoming air may be cooled and dried in the air conditioning unit located downstream of fan AC2. Conditioned air serves to pressurise the Technical Rooms other than the Battery Room.

2.3.2 Individual heaters are provided in the ducting to the Telemetry, Control and MCC Rooms and also to the Instrument Maintenance Shop. Air is vented from these rooms directly to the corridors via door louvres or transfer ducting.

2.3.3 Each Fire Pump Room is provided with a 1.5kW heater to maintain the room temperature at $+5^{o}C$. An inlet duct fitted with an automatically operated damper is provided to supply additional air from a safe area when the fire pumps start.

2.3.4 The Auxiliary Generator Room, and the Substation are each provided with two axial flow supply fans, one duty and one standby in each case. Each pair of fans draws air from a safe area via an inlet duct which is fitted with an automatically operated damper. In the case of the Substation, the fans will start and stop in response to temperature within the compartment. The fans in the Auxiliary Generator Room will start and stop automatically in response to the generator control system.

2.3.5 Exhaust air from each compartment is discharged to atmosphere via individual exhaust ducts. Each duct is provided with an automatically operated damper which opens when the fan is started.

2.3.6 The inlet and exhaust duct will close on failure of the ventilation fans. Fire dampers are also provided in the inlet and outlet ducts; the dampers will operate in response to signals from the fire and gas detection panel.

2.3.7 The Battery Room is ventilated by two explosion proof axial flow fans, one duty and one standby. Air for the Battery Room is drawn in through low level louvres and exhausted through a high level duct. The Battery Room ventilation system is entirely separate from the remainder of the ventilation system. The inlet and outlet ducts are each provided with a fire damper.

2.3.8 The individual ventilation in the battery, transformer or auxiliary generator rooms will be shut down prior to the release of halon initiated by second level smoke detection within each room.

2.3.9 The fire dampers in the electrical workshop will close on 2nd threshold smoke detection followed by halon release.

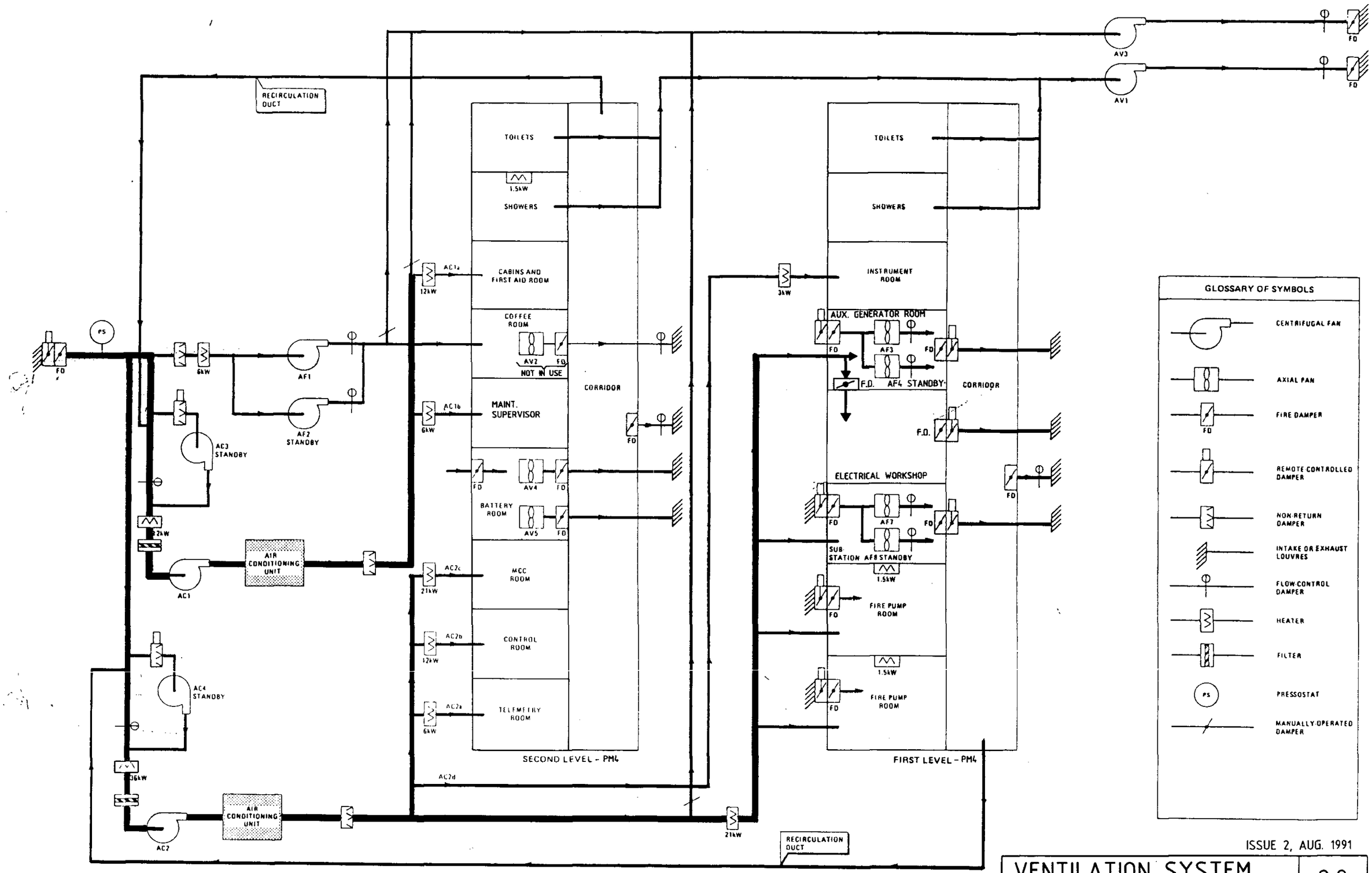
2.4 Module 4 General Exhaust Arrangements

2.4.1 Air is exhausted from the toilets and showers by centrifugal fan AV1 which is located in the Air conditioning Room. This fan also assists in exhausting air from the first and second floor corridors of Module 4.

2.4.2 Should Module 4 require degassing, centrifugal fan AV3 will be used. AV3 is a spark-free centrifugal fan located in the Air Conditioning Room. To enable the fan to be used after a shutdown, its motor is powered by a 48V battery. The fan exhausts air from the rooms via the air conditioning ducts and discharges to atmosphere. The fan discharge duct is protected by a fire damper.

3. FAN CHARACTERISTICS

Tag No	Area	Type	Air Flow (m^3/h)	Absorbed Power (kW)	Motor Power (kW)	Motor Speed (rev/min)
AC1	Cabins & Recreation Room	Z66	1700	1.75	2.2	1450
AC2	Technical Rooms	S712	5900	6.2	7.75	1450
AC3	Standby for AC1	TBA25	1700	0.7	0.9	2900
AC4	Standby for AC2	TBA40	5900	2.55	3.2	1450
AF1	Coffee Room Supply	Hyper Cobra	600	0.1	0.3	1450
AF2	Standby for AF1	Hyper Cobra	600	0.1	0.3	1450
AF3	Auxiliary Generator Room	H60-0,35	23600	6.35	8.5	2900
AF4	Standby for AF3	H60-0.35	23600	6.35	8.5	2900
AF7	Substation	H50-0,35	7700	1.13	1.5	2900
AF8	Standby for AF7	H50-0,35	7700	1.13	1.5	2900
AV1	Sanitary Rooms exhaust	Hyper Cobra	720	0.15	0.3	1450
AV2	Coffee Room exhaust	H35-0,35	1500	0.048	0.1	1450
AV3	Degassing	TBA 40	Variable	1.85	2.2	2850
AV4	Battery Room	Centriplast No 31	1000	-	0.3	1450
AV5	Standby for AV4	Centriplast No 31	1000	-	0.3	1450



ISSUE 2, AUG. 1991

VENTILATION SYSTEM. PM4.

6.9

SLOPS SYSTEM

1. GENERAL

The Slops System serves to collect waste liquid for subsequent disposal. Two independent sub-systems are installed to dispose of the liquid according to its source.

2. PROCESS EQUIPMENT DRAINS

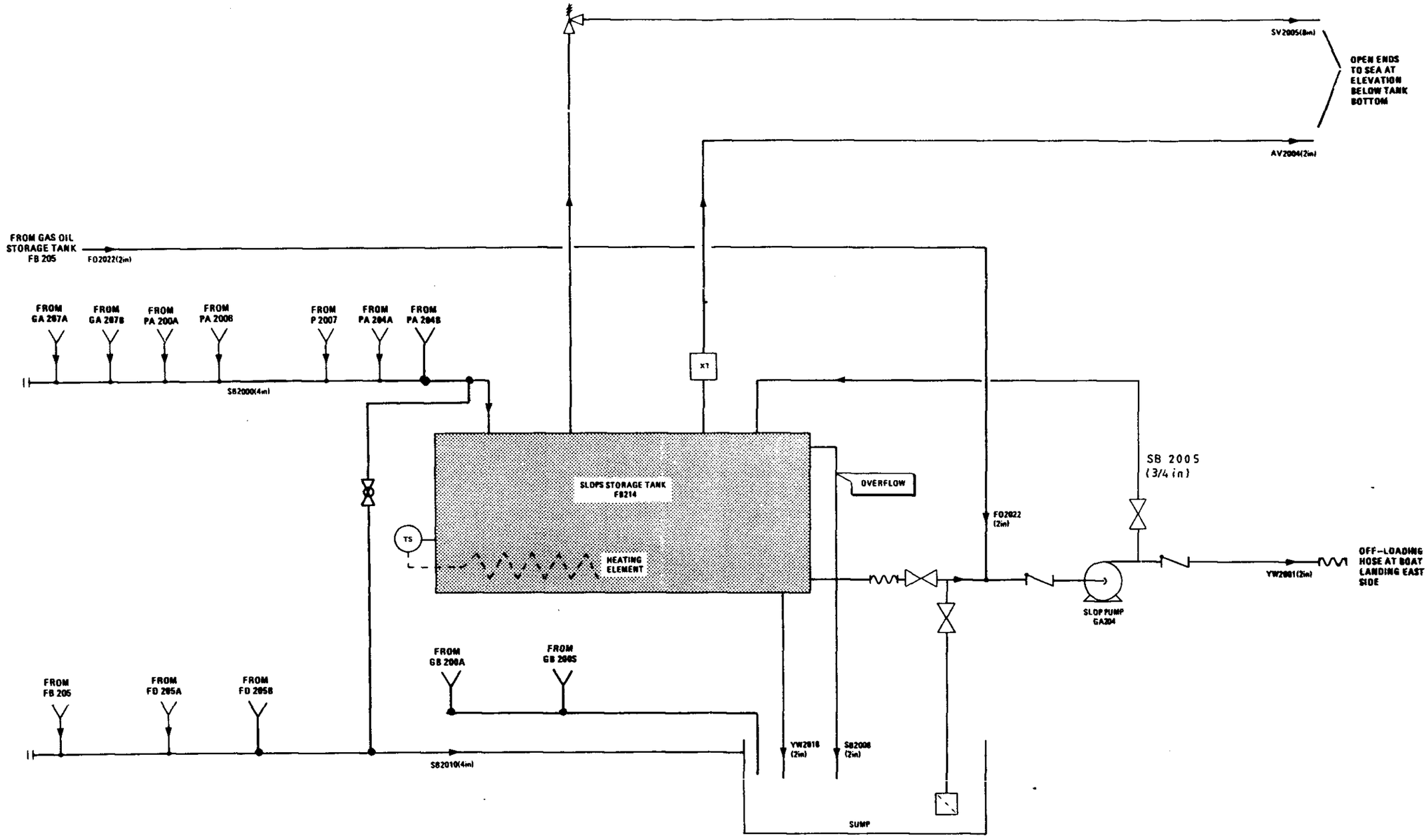
2.1 Liquid drained from scraper traps PA 200 A and B and PA 202, the liquid separators, the air compressors and the test and start-up manifold, is collected in slop storage tank FB214 located in the Cellar Deck under Module 4. This is a closed drain system.

2.2 The slops storage tank has a capacity of $10m^3$. It is vented to atmosphere through 2in line Av2004 via a flame trap; relief valve SV218 set at 0.015 bar provides large capacity relief for fire safety purposes. The temperature of the tank contents is maintained at $5^{o}C$ by a heating element controlled by temperature switch TS209. Level indicator L1213 shows the tank contents and initiates an alarm at high level.

2.3 Any liquid released in the Pumphouse is collected in the slops sump mounted below slops storage tank FB214. This sump also collects any overflow from FB214. Hand pump GA215 is used to transfer the contents of the sump into FB214.

2.4 Liquid collected in the storage tank can be discharged into a supply boat by slop pump GA204 via a flexible hose at the boat landing. This pump can also be used to empty gas oil storage tank FB205.

2.5 Rain water and other liquid waste is collected from drains at various points on the Drilling Deck and is discharged overboard via the 30in slops outlet.


SV2005(8in)
OPEN ENDS TO SEA AT ELEVATION BELOW TANK BOTTOM
AV2004(2in)
FROM GAS OIL STORAGE TANK FB 205
FO2022(2in)
FROM GA 207A
FROM GA 207B
FROM PA 200A
FROM PA 200B
FROM P 2007
FROM PA 204A
FROM PA 204B
SB2000(4in)
X1
SLOPS STORAGE TANK FB214
OVERFLOW
SB 2005 (3/4 in)
FO2022 (2in)
TS
HEATING ELEMENT
SLOP PUMP GA204
YW2001(2in)
OFF-LOADING HOSE AT BOAT LANDING EAST SIDE
FROM FB 205
FROM FD 205A
FROM FD 205B
FROM GB 200A
FROM GB 200S
SB2010(4in)
YW2010 (2in)
SB2008 (2in)
SUMP

WELLHEAD HYDRAULIC SYSTEMS (CAMERON)

1. GENERAL

1.1 Each well cluster is provided with a Cameron hydraulic unit to power the remote operated valves associated with that cluster. Each power unit has two separate hydraulic systems, one 310 bar system for the sub-surface valves, and one 207 bar system for the other valves, with a common 1136 litre reservoir. The systems in both units are corss connected to provide power in the event of a unit failure. The 207 bar system is further reduced to 103 bar to provide power to the 'normal header', emergency header and emergency sub-header (via a s/d solenoid).

1.2 In addition, an emergency accumulator bank is provided to supply sufficient hydraulic power to operate the master and kill valves for one well cluster in the event of failure of both hydraulic units.

1.3 The Cameron System was modified in 1991 into two distinct parts, Producing & Non-Producing wells. The Producing wells control panels can be controlled locally from the Cameron panel or remotely from the Central Control Room. The Non-producing well control panels, known as 'Dummy Panels' have no remote control facility, only a manual control from the Cameron panel. An emergency shut-down signal (ESD/DSD)will shutdown the hydraulic supply (1500 PSI) to this manual system. See drawing FF 83 16 00 0068 SHT.2.

2. HIGH PRESSURE SYSTEMS (310 BAR)

2.1 Each system includes two air-driven pumps operating in parallel and an emergency hand pump, all pumps being fed from a 1136 litre reservoir via a suction manifold. A tapping from the discharge line from each set of pumps is led to a pump governor which varies the pump speed accordingly. Both discharge lines incorporate pressure safety valves which relieve excess pressure into the reservoir.

2.2 The lines to each sub-surface valve are provided with a 1.9 litre capacity piston type accumulator and check valve. These are provided to maintain pressure to the valve while another is being opened and to absorb pressure variations due to temperature changes.

2.3 Thirteen fail safe hydraulic pilot valves are provided, one to control the operation of each of the downhole valves, and one in the common line for the cluster shut-in of the downhole valves. Each valve is air operated with spring return and incorporates a bypass.

2.4 This header also supplies each of two dummy panels (one for each cluster) see section 4.2

3. LOW PRESSURE SYSTEM (207/103 BAR) NORMAL AND EMERGENCY HEADERS.

3.1 This is similar to the 310 bar system, comprising two air driven pumps (with a combined capacity of 21.2 litres/min), a pump governor, an emergency hand pump and four accumulators. The accumulators are cylindrical with a unit capacity of 102 litres and store sufficient fluid to open up one well with a pressure drop of not more than 69 bar.

3.2 Pressure reducers installed in the lines downstream from the accumulators reduce the pressure to 103 bar for the valves equipped with Axelson actuators: ROV202, ROV203, ROV204, ROV 207 and ROV210.

3.3 The pumps will take approximately 2.5 minutes to recharge the accumulators after a well has been opened, therefore this is the minimum time delay between opening wells. Valve operation is via pilot valves similar to those installed in the 310 bar system.

3.4 This system provides hydraulic power to the control panels for the producing wells only. An emergency sub-header is taken from the emergency header via a shutdown solenoid. See section 4.

4. LOW PRESSURE SYSTEM (103 BAR) EMERGENCY SUB-HEADER, NON-PRODUCING WELLS.

4.1 This hydraulic system is used to supply the dummy control panels which in turn control ROV's for the non-producing wells. This em. sub-header is shutdown on ESD/DSD via a solenoid valve. See diagram 6.11.1 for connection details.

There are no pilot valves in the dummy control panels, so operation is manual only from the hand valves mounted on the panel front. However, upon an ESD/DSD signal being activated, an isolation valve (Rev. 218A) shuts off and drains the pressure in the sub-header causing any ROVs to close.

4.2 High pressure system (310 bar) non-producing wells.
This header also supplies two MK2 dummy panels (one on each cluster). Each of these dummy panels (one in slot for well 5 and one in slot for well 20) supplies the two hydraulic lines going to the wellhead area A & B. A flexible hose can be coupled to this line and any selected ROV 201 for a non-producing well. This ROV can now be manually controlled from the Cameron Unit.

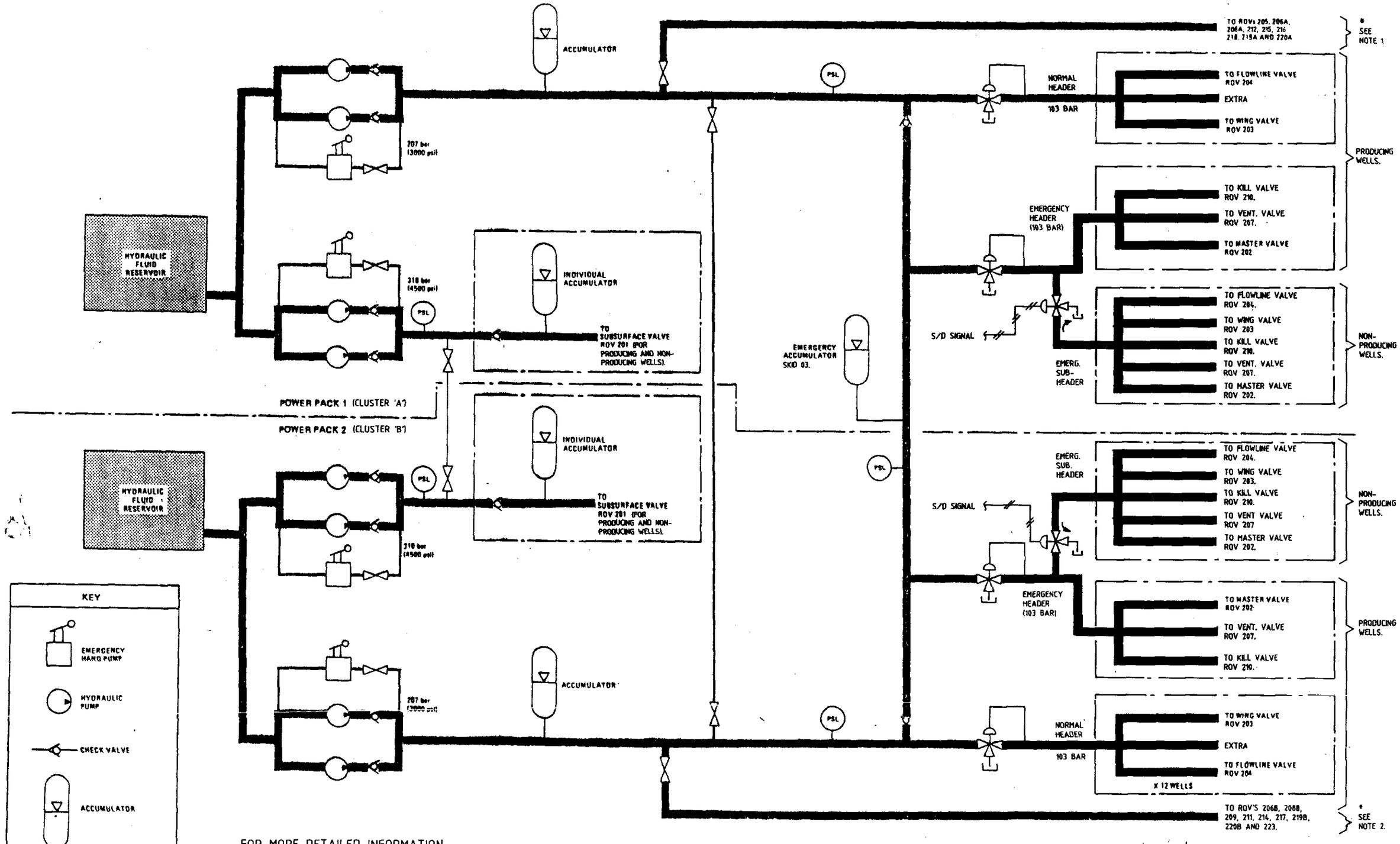
5. EMERGENCY ACCUMULATOR BANK

5.1 This unit comprises five 303 litre spherical accumulators, two check valves, a filter, a manifold with inlet and outlet isolating valves, and a pilot valve for initiating an alarm in the event of accumulator low pressure.

5.2 Connected to the 207 bar emergency headers of units 1 and 2, the emergency accumulators provide sufficient storage capacity to operate all valves (ROV02, ROV07 and ROV10) in one cluster should the power unit fail.

6. POWER AND CONTROL SYSTEMS(207 AND 414 BAR)

Power for the air motors is provided from the 10 bar plant air system The pilot valves are supplied from the 3 bar instrument air system. A nitrogen supply is installed for emergency use.



FOR MORE DETAILED INFORMATION
SEE FF83.16.23.1211.

* NOTE: 1. THESE ROV'S ARE NOT IN USE:
ROV 212 & 218.

2. THESE ROV'S ARE NOT IN USE:
ROV 209, 211, 217, 219B, 220B & 206B.

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WELLHEAD HYDRAULIC SYSTEMS (CAMERON)	6.11.1

WELLHEAD HYDRAULIC SYSTEM (MASONEILAN)

1 GENERAL

Power for the 24 wellhead choke and control valves is supplied by a Masoneilan hydraulic system.

2 CHOKE VALVE SYSTEM

2.1 Power is provided by two pumps, GA116AX and BX, operating in parallel. Each pump has a capacity of 38 litres/min at 100 bar discharge pressure, and is driven by a 7.5kW electric motor operating at 1430 rev/min. Both pumps are provided with suction and discharge filters.

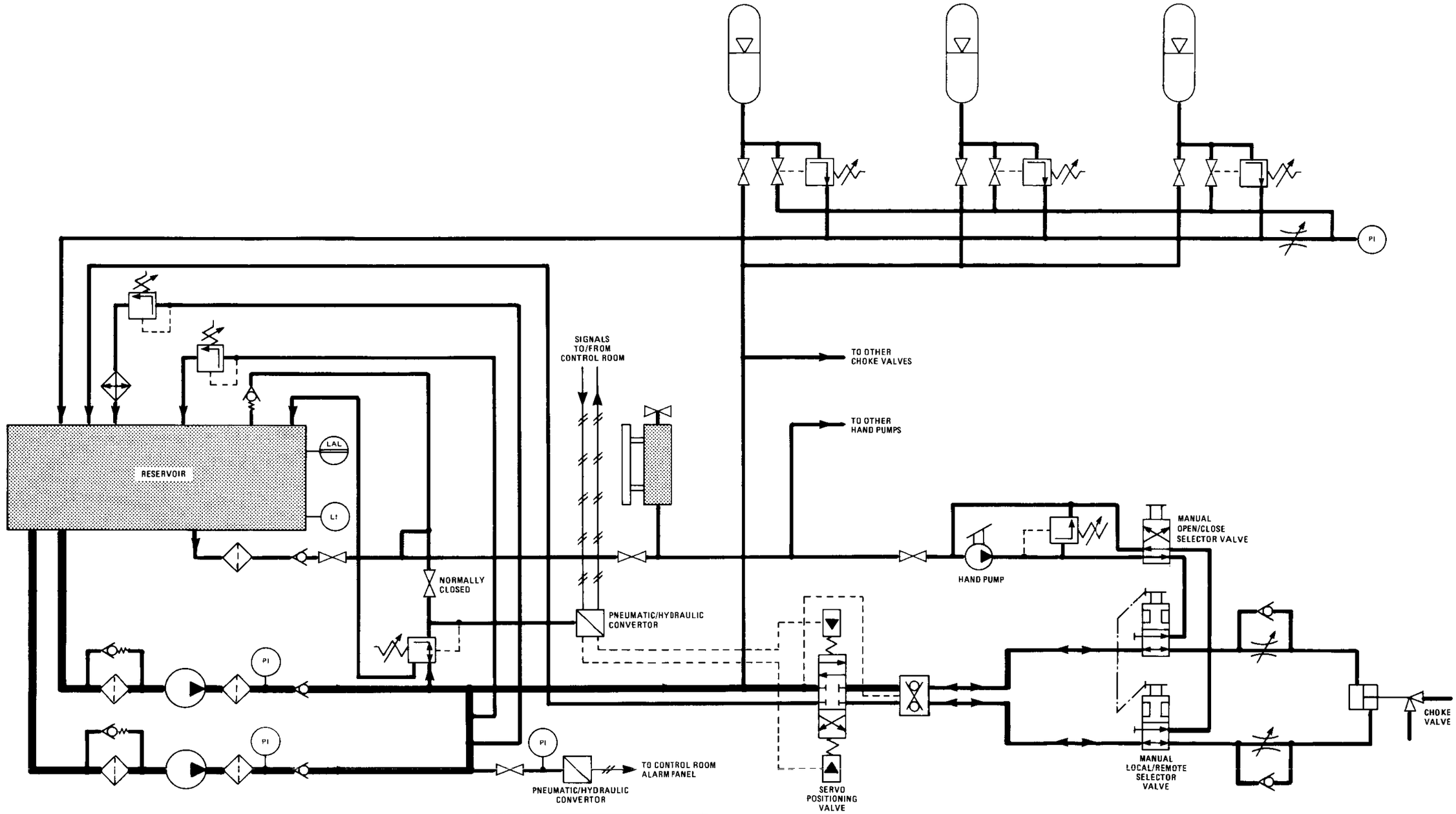
2.2 Both pumps run continuously, with one pump pressurising the system and the other as a back-up. At a system pressure of 65 bar or above, the back-up pump relieves into the reservoir, and at a pressure of 100 bar the main pump relieves into the reservoir. The combined relief line incorporates a heat exchanger to limit the temperature of the oil when recycling.

2.3 Three hydraulic accumulators are incorporated in the system. Two, each of 30-litre capacity, provide sufficient reserve capacity to shut all choke valves in the event of pump failure, and the third, of 10-litre capacity, acts as a normal system accumulator. The reserve accumulators are normally isolated from the choke valve control line by a control valve.

2.4 The reservoir is of 290-litre maximum capacity. A level switch installed in the tank stops the pumps at low level and initiates an alarm in the Platform Control Room and in the QP Control Room.

2.5 Control of each choke valve is via a servo positioning valve, which receives signals from the choke valve controller and from a feedback positioner on the choke valve, via a pneumatic/hydraulic converter. Any discrepancy in the signals results in the servo valve moving in the appropriate direction to reposition the choke valve and thus equalise the signals. Power for the servo valve is provided from the pumps' discharge line via a 30 bar pressure-reducing valve.

2.6 A standby hand pump of 0.02-litre capacity per double stroke and a selector valve are installed in a local control box for each valve. These enable each choke valve to be operated manually should complete failure of the power unit occur. The hand pump can take its suction from the return side of the valve actuating cylinder to permit the pump to operate in the event of complete fluid loss from the reservoir, isolation of the normal suction line being by a hand valve.



KEY

- FILTER
- HEAT EXCHANGER
- RELIEF VALVE
- PRESSURE CONTROL VALVE
- THROTTLE VALVE
- PILOT CONTROLLED CHECK VALVE
- CHECK VALVE
- SPRING-LOADED CHECK VALVE
- ACCUMULATOR
- MOTOR DRIVEN HYDRAULIC PUMP

ISSUE 1. OCTOBER 1980

WELLHEAD HYDRAULIC SYSTEM (MASONEILAN) 6.11.2

WELLHEAD HYDRAULIC SYSTEM (MASONEILAN)

1. GENERAL

This system is taken out of service, and all system units are disconnected. The chokes for producing wells are manually operated by screw jacks.

DP2 – MOD. 02

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

CAMERON HYDRAULIC UNIT–
WELL CLUSTER 'A' (WEST)
SKID 01
(VIEWED FROM FRONT OF PANEL)

WELL 1	WELL 2	WELL 3	WELL 4	WELL 5	WELL 6	WELL 7	WELL 8	WELL 9	WELL 10	WELL 11	WELL 12	PLATFORM VALVES	
X	X	I	X	S MK.2	S MK.1	S MK.1	B	B	X	S MK.1	S MK.1	PL.	PL.

CAMERON HYDRAULIC UNIT–
WELL CLUSTER 'B' (EAST)
SKID 02
(VIEWED FROM FRONT OF PANEL)

WELL 13	WELL 14	WELL 15	WELL 16	WELL 17	WELL 18	WELL 19	WELL 20	WELL 21	WELL 22	WELL 23	WELL 24	PLATFORM VALVES	
S MK.1	S MK.1	B	S MK.1	X	S MK.1	X	S MK.2	S MK.1	X	S MK.1	B	PL.	PL.

LEGEND:	CONTROL PANEL TYPE
PL. PLATFORM	–PLATFORM CONTROL PANEL
X. PRODUCTION	–PRODUCTION CONTROL PANEL *
B. BACK–UP	–PRODUCTION CONTROL PANEL *
I. INJECTION	–PRODUCTION CONTROL PANEL *
S. SECURED	–DUMMY CONTROL PANEL (MK.1 OR 2)

Installation: DP2 | System: HYD.
Job no.: MR16155 | Scale:
CAMERON HYD. UNIT
CONTROL PANELS ARRANGEMENT
SKID 01 & 02
Drwg. no.: FF 83 16 00 0068 | Rev.: 00E | Sheet: 2
FRIGG FIELD
elf aquitaine norge a/s
P.O.Box 168, 4001 Stavanger
Contractor: NPC – NYBRO BJERCK
NORWEGIAN PETROLEUM CONSULTANTS A.S.
REGION STAVANGER
HYD103H.DWG

Rev.	Date	DESCRIPTION	by	appr.
00E	10.06.91	AFC	TH	CS

CAD. DWG. NPC-NYBRO BJERCK AS

METHANOL STORAGE AND INJECTION

1. GENERAL

1.1 The methanol injection system is divided into two sub-systems each discharging to a separate part of the process system. The sub-systems take their suction from a common storage tank and suction header.

2. METHANOL

2.1 Methanol storage tank FB200 is a fixed vessel of $50m^3$ capacity located below Module 4.

2.2 The tank is protected against overpressurisation by two pressure relief valves relieving to atmosphere. Normal tank venting is to atmosphere through a 6 in line incorporating a flame trap.

2.3 Tank replenishment is from $9m^3$ capacity portable tanks. Methanol is gravity fed from the portable tanks to the storage tank.

3. METHANOL INJECTION

3.1 General

The 24 methanol injection pumps used for wellhead injection are located below Module 1. The injection pumps for the sea lines are located in Module 3.

3.2 Methanol Injection to Sea Lines

3.2.1 Methanol is injected into the sealine A by the two injection pumps GA211 A and S through two remote operated valves (ROV214 and 216). The valves are arranged so that one or booth pumps can feed the sealine.

3.2.2 Each pump is driven by a 7.5kW electric motor and has a capacity of between O and 478 litres/h at a discharge pressure of 186 bar. Flowrate is regulated by micrometer adjusters.

3.3 Methanol Injection to Wellheads

Twenty four pumps, GA250 A to Z, are provided, each pump injecting methanol to one christmas tree. The pumps are arranged in six sets of four, each set being driven by an electric motor.

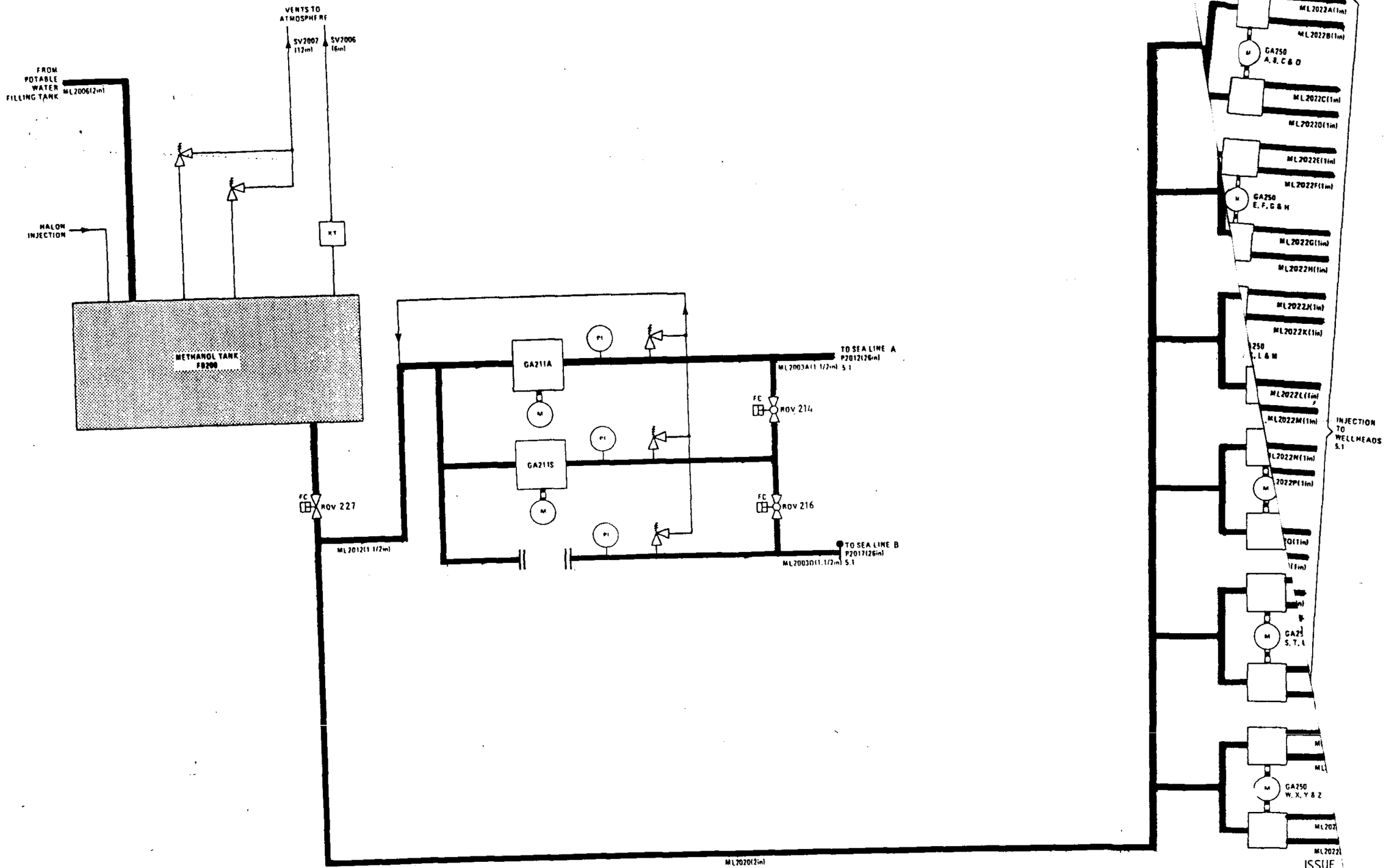
4. CONTROL

4.1 The remote operated valves in the injection lines are controlled from either the Platform Control Room or QP Control Room. Power for the operation of these valves is provided from the 207 bar hydraulic system; all other valves in the Methanol System are hand operated.

4.2 Methanol pumps GA211 are controlled via pushbuttons located in the MCC Room, the Platform Control Room, QP Control Room and the local control panel. With the Local/Remote selector switch in the MCC Room set to LOCAL, control is from the local or MCC Room pushbuttons; with the switches et to REMOTE, control is from either control room.

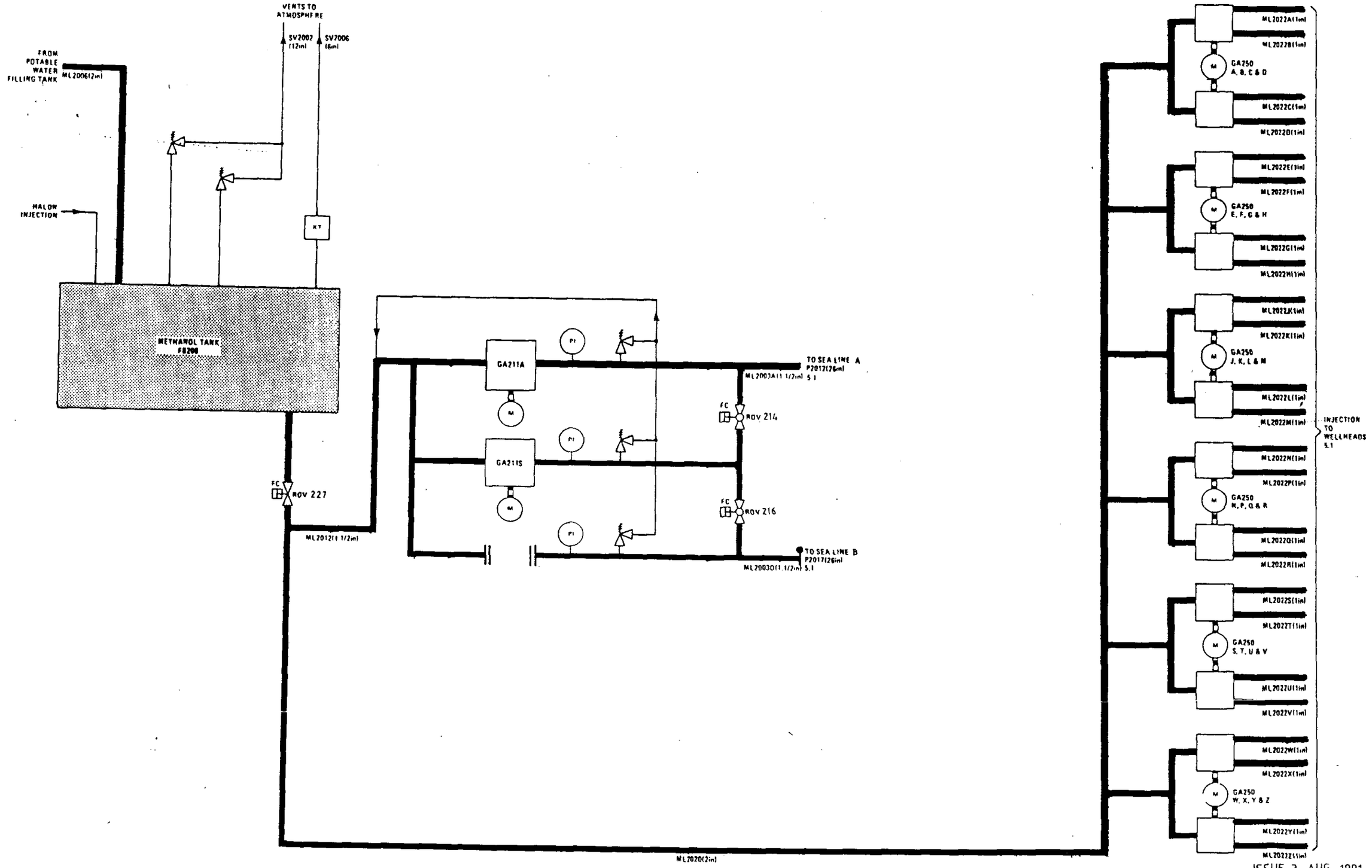
4.3 Pumps GA211 A and S cannot be set for automatic changemover for duty and standby. Upon the failure of an operating pump, its replacement must be started manually.

4.4 Fire detection or low liquid level in methanol tank FB200 will initiate shutdown of all the injection pumps.



ISSUE

METHANOL STORAGE AND INJECTION



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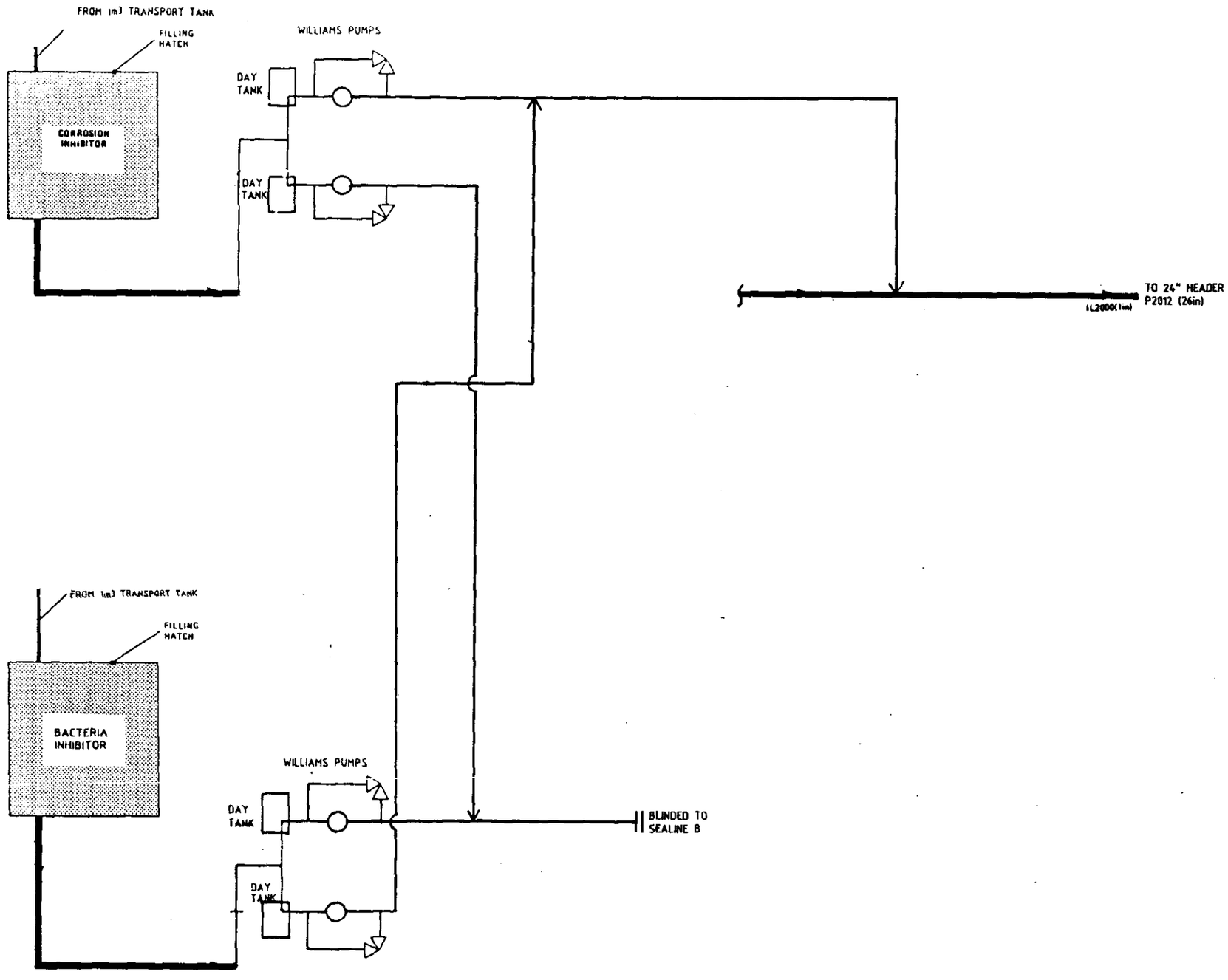
METHANOL STORAGE AND INJECTION	6.12

CORROSION/BACTERIA INHIBITOR

1. GENERAL

1.1 The inhibitor system is located outside PM3 on the east side. The system comprises two $1m^3$ transportation tanks, one for corrosion inhibitor and one for bacteria inhibitor. Each tank is connected to a storage tank, and the inhibitors are injected by 2 William pumps into sealine 'A'. The injection rate is set to 3 litres/day.

1.2 The corrosion/bacteria inhibitor is injected into sealine 'A' via a 1" line which incorporates a manual isolating valve at the injection point.


FROM 1m3 TRANSPORT TANK
FILLING HATCH
CORROSION INHIBITOR
WILLIAMS PUMPS
DAY TANK
DAY TANK
TO 24" HEADER P2012 (26in)
FROM 1m3 TRANSPORT TANK
FILLING HATCH
BACTERIA INHIBITOR
WILLIAMS PUMPS
DAY TANK
DAY TANK
BLINDED TO SEALINE B

NORMAL LIGHTING

1. GENERAL

1.1 Lighting on DP2 is of the following three types:

(a)	Normal lighting	Supplied at 220V ac single phase from distribution boards LL01, LLO2 and LL03, which are fed from MCC switchboards A and B.
(b)	Emergency lighting	Supplied at 48V dc from the platform central dc supply.
(c)	Emergency maintained lighting	Normal 220V ac luminaries provided with rechargebale batteries and automatic changeover facilities.

2. DESCRIPTION

2.1 Distribution

2.1.1 Three distribution boards control the lighting supplies at 220V ac; the main features are shown in Diagram 6.14. A few outlets supply small power sockets and shower heaters, but these are treated as part of the lighting system. Note that distribution boards LL01 and LL02 supply indoor lighting, whereas LL03 supplies outdoor lighting, including floodlights.

2.1.2 All feeders from the boards are single phase and controlled by MCBs. Important outdoor circuits are controlled by a sun switch, which switches them on at dusk and off at dawn.

2.1.3 Normal lighting is available as long as either the 5.5kV input via submarine cable from TCP2 or the standby 380V supply is present. If both of these should fail, the only lighting available is the emergency lighting described in Section 10.14.

2.2 Lighting Fittings

2.2.1 For indoor use most of the normal lighting fittings are twin tube, 2 x 40W, cold-cathode, fluorescent luminaires. Some single tube fittings and some shorter twin tube, 2 x 20W fittings are used in smaller areas. Cabin mirrors are provided with 60W tubular incandescent fittings.

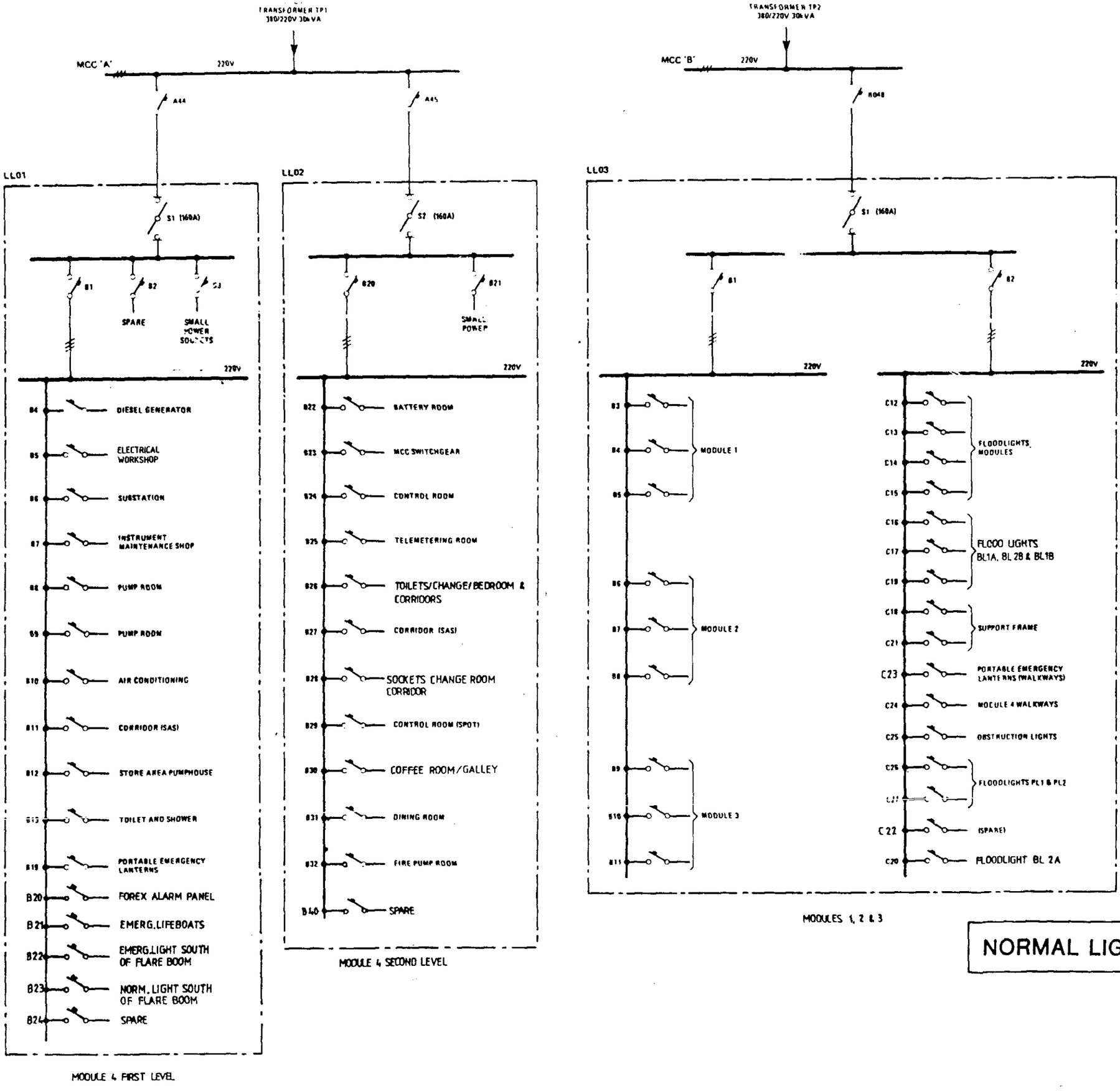
2.2.2 For outdoor use both fluorescent and floodlight fittings are used, both types being weather proof. Those in hazardous areas are of the 'increased safety' type, suitable for Zone 1 areas. The floodlights used are of the 400W mercury vapour type and are explosion proof.

2.3 Lighting Levels

2.3.1 The designed levels of lighting are as follows:

- Living Quarters	100 lux
- Control Rooms	500 lux
- Electrical Rooms	500 lux
- Wellhead Module	75 to 150 lux
- Working Areas	35 to 75 lux
- Stairways and Passageways	35 to 75 lux
- Other Zones	25 to 50 lux

FOR 48V EMERGENCY LIGHTING SEE SECTION 10.14



CHAPTER 7

TRANSPORT FACILITIES

CONTENTS

DIAGRAM

Issue 1. Oct. 1980

SUPPLY VESSELS

1 GENERAL

1.1 It is anticipated that the following supply vessels will be engaged in the replenishment of platforms

1.2 The table covers relevant data concerning the supply vessels' dimensions and capabilities

Vessel	LENGHT OVERALL	BEAM	DRAUGHT	GROSS TONNAGE (TONNS)	FREE DECK SPACE	CAPACITIES					DISCHARGE RATES				METHANOL TRANSPORT CAPACITY
						DECK CARGO	POTABLE WATER	BULK TANKS	DRILL WATER	FUEL OIL	POTABLE WATER	DRILL WATER	FUEL OIL	CEMENT	
VIKING FIGHTER	69.30m	15.50	5.70	2075	40x12.5m	1200T	1000T	6000cbf	730T	500m^3	150m^3/h HEAD 80m	150m^3/h HEAD 80m	170m^3/h HEAD 80m	50T/h	120m^3
NORMAND SKIPPER	58.95m	12.60	4.10	499			276T	4280cbf		453m^3					80m^3

NOTE

VIKING FIGHTER is equipped as FI-FI class II and oil recovery vessel

NORMAND SKIPPER is equipped as FI-FI class I

ISSUE 1.Jan.-92

HELIDECK

1. GENERAL

1.1 The Helideck is installed above the Living Quarters at the north end of the platform.

1.2 The Helideck measures 25.3m from edge to edge and is octagonal. A safety net 2m wide is provided around its perimeter.

1.3 Access to and from the Helideck is provided by two stairways located on the south west and south east sides.

1.4 Helideck lighting is provided by four floodlights located on the south west and south east sides.

1.5 A ring of alternate yellow and blue landing lights spaced at 3m intervals is located around the Helideck perimeter.

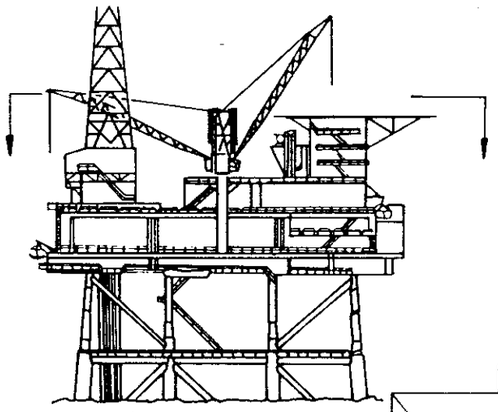
1.6 The Helideck markings and colours are shown in Diagram 7.2

2. HELICOPTER

2.1 The Helideck is designed for the Sikorsky S61N helicopter or its equivalent

2.2 Principal specifications are as follows:

- Rotor diameter	18.9m (62ft)
- Power unit	2 turbines
- Fuel	Kerosine
- Maximum weight	9299 kg (20500 lb)
- Carrying capacity	23 passengers
- Payload at maximum range	635kg (1400 lb)
- Range	361.37km (195 nautical miles)
- Speed	222.3 km/h (120 knots)



KEY VIEW

PLATFORM NORTH N

MK60 MAINT. PL.FORM

CONTAINER

CONTAINER

ALTERNATE BLUE AND WHITE PERIMETER LIGHTS

DP2

WHITE

BLACK

H

WHITE

DP2

BLACK

YELLOW

GREY

LIEBHERR MAINT. PL.FORM

25550

1900

ISSUE 3, OCTOBER 1988

HELIDECK	7.2

CHAPTER 8

MATERIALS HANDLING

CONTENTS

DIAGRAMS

Issue 3, June 1986

CRANES

1. GENERAL

Two pedestal mounted cranes are provided for supply and general lifting duties on the platform. A Liebherr Bos 15/400 Dex on the west side, and a Bycyrus - Erie Mk 60 marine crane on the east side.

2. LIEBHERR BOS 15/400 DEX

2.1 Power to the crane is supplied by a Mercedes Benz diesel engine Om 403 via hydraulic transmission.

2.2 The boom is 34m long and operates within the range of 18 to 81 Deg. above horizontal.

2.3 Two cargo handling hoists are fitted to the crane boom, a main hoist and a whip hoist. The maximum capacity on the main hoist is 15 ton (platform lift) and the maximum capacity on the whip hoist is 4.5 ton (platform lift).

2.4 The load performance of the crane (load case I platform lift)

Boom angle (deg)	Radius (m)	Load Case I (Capacity in metric tonnes)	II	III	IV	V	VI
81.0	7.5	15.0	10.5	9.0	7.5	4.5	3.0
76.5	10.0	15.0	10.5	9.0	7.5	4.5	3.0
71.0	12.5	15.0	10.5	9.0	7.5	4.5	3.0
68.0	14.0	15.0	10.5	9.0	7.5	4.5	2.5
66.0	15.0	15.0	10.5	9.0	7.5	4.1	2.3
64.5	15.8	15.0	10.5	9.0	7.0	3.8	2.1
63.5	16.0	15.0	10.5	8.8	6.9	3.7	2.1
62.3	16.6	14.4	10.5	8.5	6.5	3.5	2.0
55.0	20.0	11.0	8.0	6.5	5.0	2.7	1.4
42.0	25.0	7.8	5.5	4.4	3.4	1.7	0.8
18.0	30.8	5.4	3.7	3.0	2.2	1.0	0.4
Whip hoist							
81	9.0	4.5	4.5	3.6	3.2	1.9	1.2
18	34.0	4.5	3.1	2.7	2.0	0.8	0.3

3. BUCYRUS-ERIE MK 60

3.1 Power to the crane is supplied by a General Motors 12V-71N, twelve cylinder diesel engine, via hydraulic transmission.

3.2 The boom is 36.5m long and operates within the range 80° above 12° below horizontal.

3.3 Two carge handling hoists are fitted to the crane boom, a main hoist and a whip hoist. The main hoist is used to support and handle the boom and for general cargo handling. The whip hoist is used for high speed handling of light loads. Protection of the whip hoist is ensured by hydraulic relief at a load of 5.08 tonnes.

3.4 An adjustable boom hoist limit device enables the boom to be stopped at given angles. Actuating pins located on the boom foot trip a microswitch which controls the operation of the boom hoist hydraulic motors. An override button located in the operator's cab enables the boom to be operated beyond the set limits.

3.5 When either hoist hook reaches a predetermined distance from the boom hoist sheaves an anti-two block warning device operates to activate a warning bell and to stop the hoist motion.

3.6 The load performance of the crane at O° list is as follows:

Boom Angle	Main Hoist		Whip Hoist	
	Radius (m)	Max Load (kg)	Radius (m)	Max Load (kg)
80°	7.5	35 380	9.0	5443
78°	9.0	35 380	10.5	5443
76°	10.5	35 380	12.0	5443
73°	12.0	34 474	13.5	5443
71°	13.5	30 845	15.0	5443
68°	15.0	27 216	17.0	5443
65°	17.0	24 494	18.5	5443
63°	18.5	21 773	20.0	5443
60°	20.0	19 958	21.5	5443
57°	21.5	18 144	23.0	5443
54°	23.0	15 876	25.4	5443
51°	24.5	13 608	26.0	5443
48°	26.0	11 794	27.5	5443
45°	27.5	10 433	29.0	5443
41°	29.0	8 618	30.5	5443
38°	30.5	7 258	31.5	5443
37°			32.0	5443
34°	32.0	5 897		
32°			33.5	4536
30°	33.5	4 536		
28°			35.0	3629
25°	35.0	3 629		
23°			36.5	3175
18°	36.5	3 175		
16°			38.0	2722
0°	38.0	2722	39.5	2268

NOTE ! OPERATIONAL RESTRICTIONS - MK 60 CRANE

TEMPORARY DERATING OF MK 60 CRANE

The Bucyrus Erie MK 60 has been derated as from 04.12.91.

Main hoist: 50%
Whip hoist: 25%

The DnV Dynamic Load Chart dated 09.12.91 is to be used until the crane is upgraded again (see next page)

DYNAMIC LOAD CHART

BUCYRUS-ERIE MK-60. 120 FT. BOOM – MAXIMUM LOAD ON HOOK

WIRE ROPE SPEC.: HOIST LINE : BR.LOAD/STRENGTH – 35000kp/190kp/mm²
BOOM HOIST LINE : BR.LOAD/STRENGTH – 46900kp/180kp/mm²

WHIP HOIST – SINGLE LINE 75%

BOOM ANGLE (DEG)	BOOM RADIUS (m)	DECK TO DECK	SIGNIFICANT WAVE HEIGHT (m) SWL (t)							
			.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0
0.0	39.6	2.5	2.0	1.5	1.0	1.0	.5	.5	.5	.5
16.0	38.2	2.5	2.5	2.0	1.5	1.0	.5	.5	.5	.5
23.0	36.7	3.0	3.0	2.0	1.5	1.5	1.0	1.0	.5	.5
28.0	35.3	3.5	3.5	2.5	2.0	1.5	1.0	1.0	1.0	1.0
32.0	34.0	4.5	4.5	3.5	2.5	2.0	1.5	1.5	1.0	1.0
37.0	32.2	5.5	5.0	4.0	3.5	2.5	2.0	2.0	1.5	1.5
80.0	8.5	5.5	5.5	4.5	3.5	2.5	2.0	2.0	1.5	1.5

MAIN HOIST – 4 PARTS 50%

BOOM ANGLE (DEG)	BOOM RADIUS (m)	DECK TO DECK	SIGNIFICANT WAVE HEIGHT (m) SWL (t)							
			.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0
0.0	38.1	.5	.5	0.0	0.0	0.0	0.0			
18.0	36.3	1.0	.5	.5	.5	0.0	0.0			
25.0	34.7	1.0	.5	.5	.5	.5	0.0			
30.0	33.2	1.5	1.0	.5	.5	.5	.5			
38.0	30.4	2.0	1.5	1.0	1.0	.5	.5			
45.0	27.4	3.0	2.5	1.5	1.5	1.0	.5			
51.0	24.6	4.0	3.0	2.5	2.0	1.5	1.0			
57.0	21.5	5.5	4.5	3.5	3.0	2.5	1.5			
63.0	18.2	8.0	6.5	5.0	4.0	3.5	2.5			
68.0	15.3	10.5	9.0	7.0	6.0	5.0	3.5			
73.0	12.2	14.5	12.5	10.5	9.0	7.5	5.5			
79.0	9.2	21.5	18.5	15.5	13.5	11.5	8.5			
80.0	7.9	24.0	22.0	15.0	16.0	14.0	10.5			
80.0	7.9	24.0	22.0	19.0	16.0	14.0	10.5			

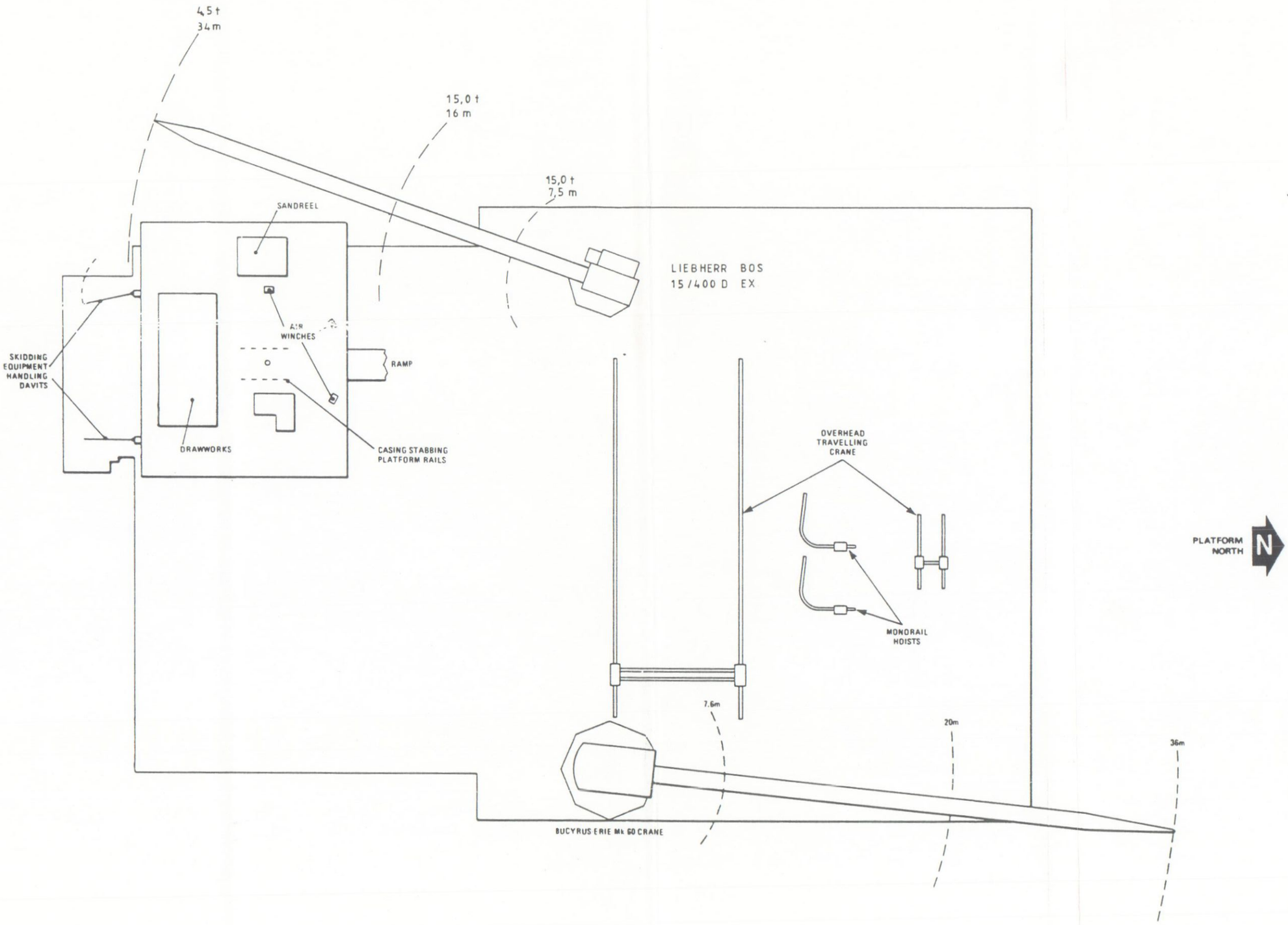
DEPENDENT ON SKILL OF OPERATOR WHETHER LOAD CLEARS SECOND WAVE

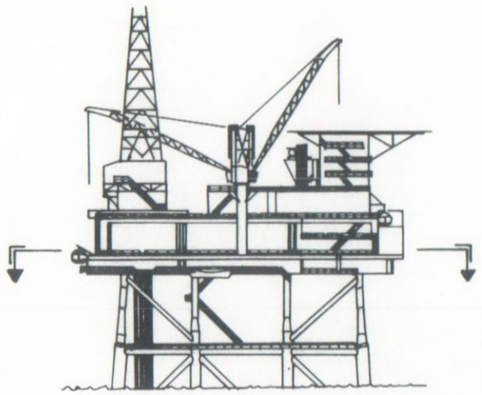
LIFTING NOT PERMITTED IF SIGN. WAVE EXCEED 3.0M OR WIND EXCEED 30KTS.

This load chart is valid from 091291 until further notice.

ELF AQUITAINE NORGE A/S MAINTENANCE DEPT.

P.M.Vølstad


4,5 t
34 m
15,0 t
16 m
15,0 t
7,5 m
SANDREEL
AIR WINCHES
SKIDDING EQUIPMENT HANDLING DAVITS
RAMP
DRAWWORKS
CASING STABBING PLATFORM RAILS
LIEBHERR BOS
15/400 D EX
OVERHEAD TRAVELLING CRANE
MONORAIL HOISTS
PLATFORM NORTH
N
7.6m
20m
36m
BUCYRUS ERIE Mk 60 CRANE



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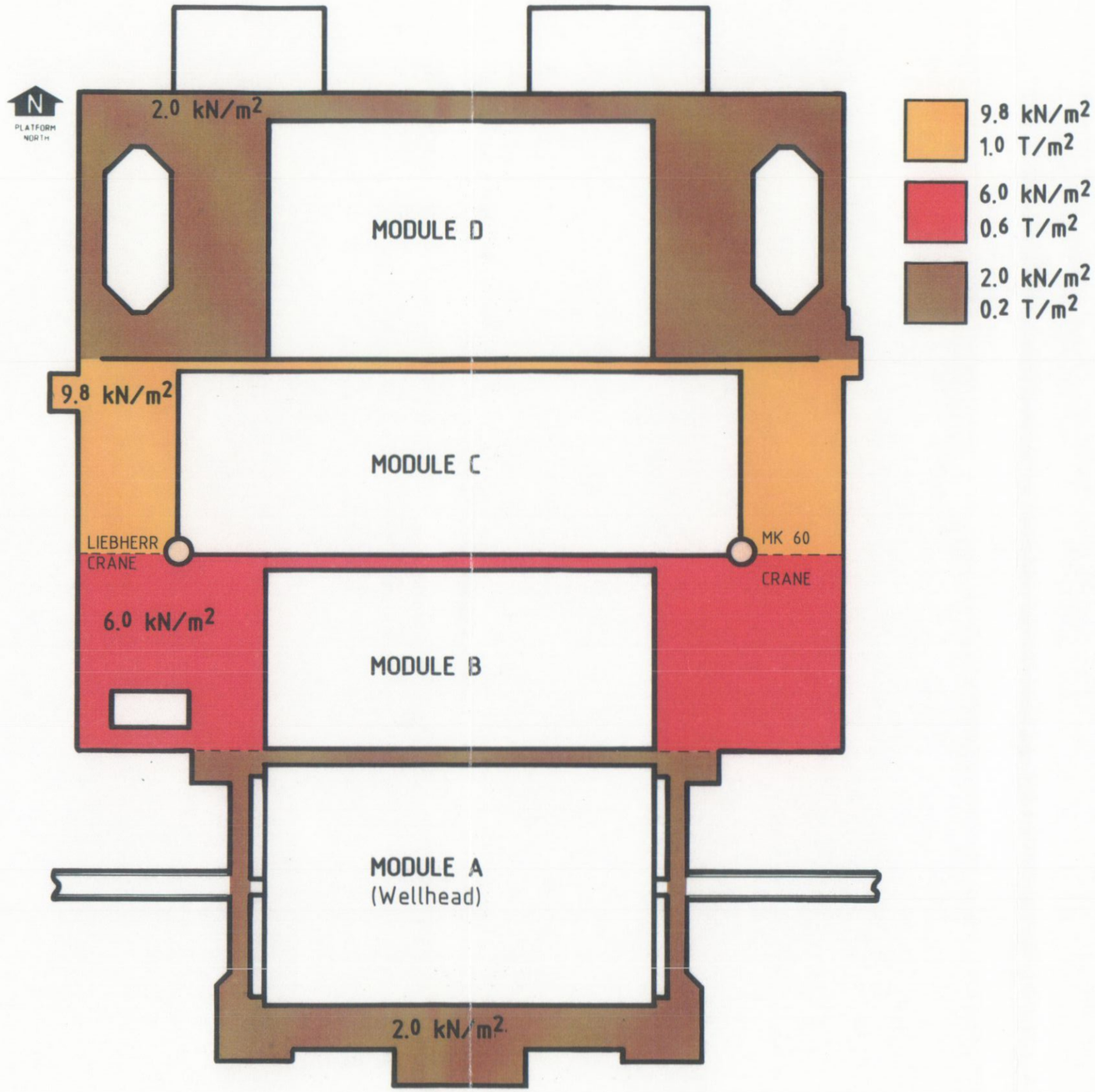
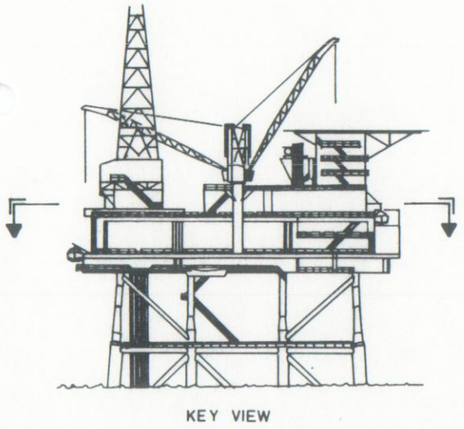


PRODUCTION DECK
ALLOWABLE LIVELOAD

ISSUE 1, OCTOBER 1984

LIVELOAD ON OPEN DECKAREAS Production deck	8.1.2.



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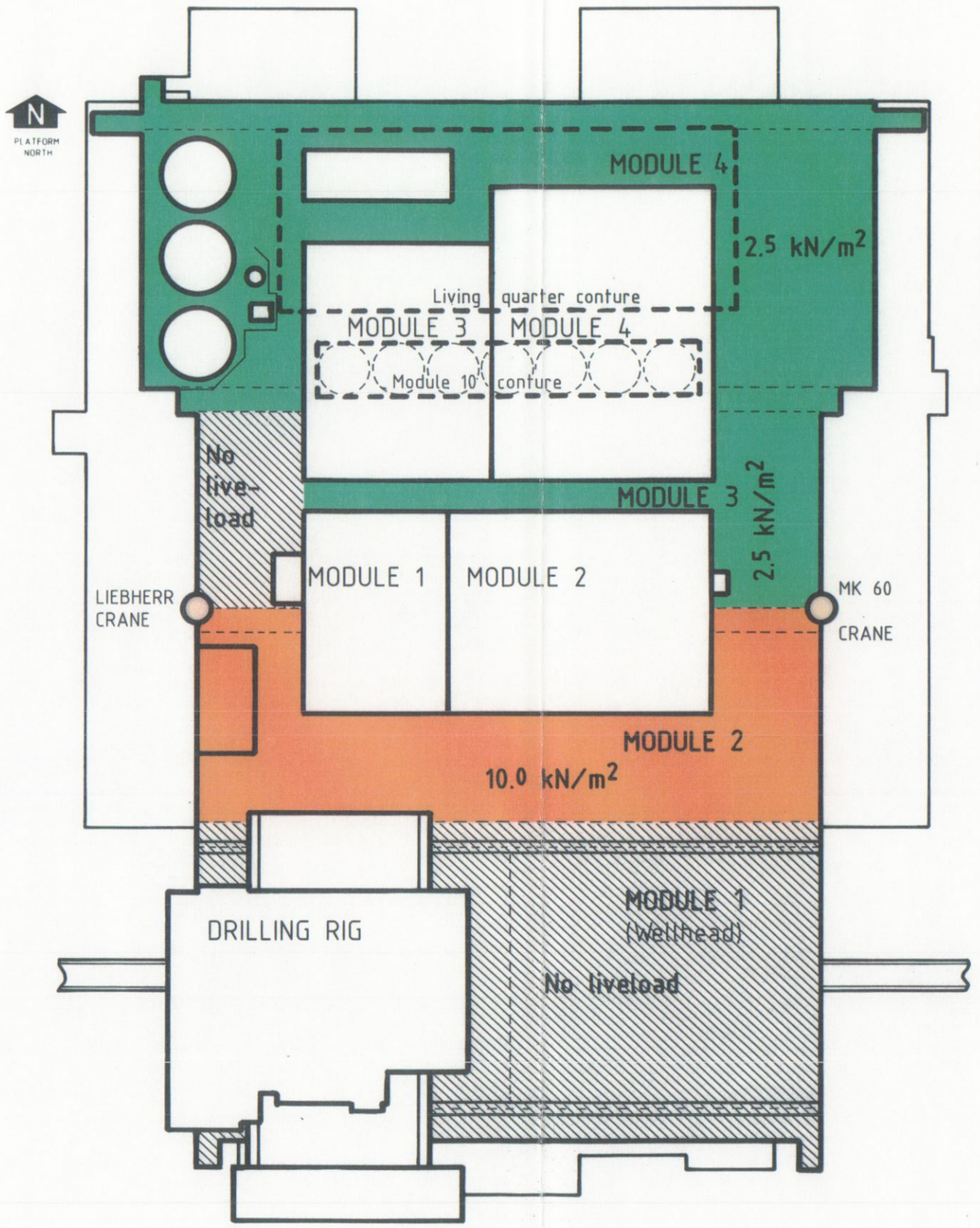
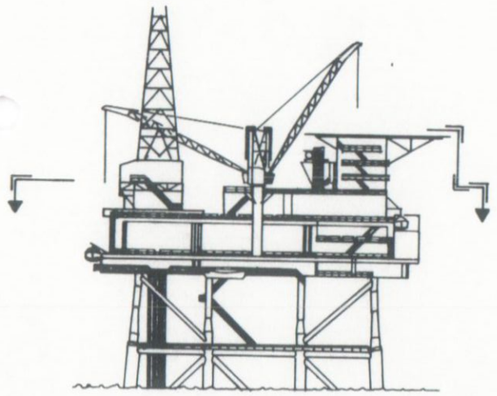


LOWER DRILLING DECK
ALLOWABLE LIVELOAD

ISSUE 1, OCTOBER 1984

LIVELOADS ON OPEN DECKAREAS Lower drilling deck	8.1.3.



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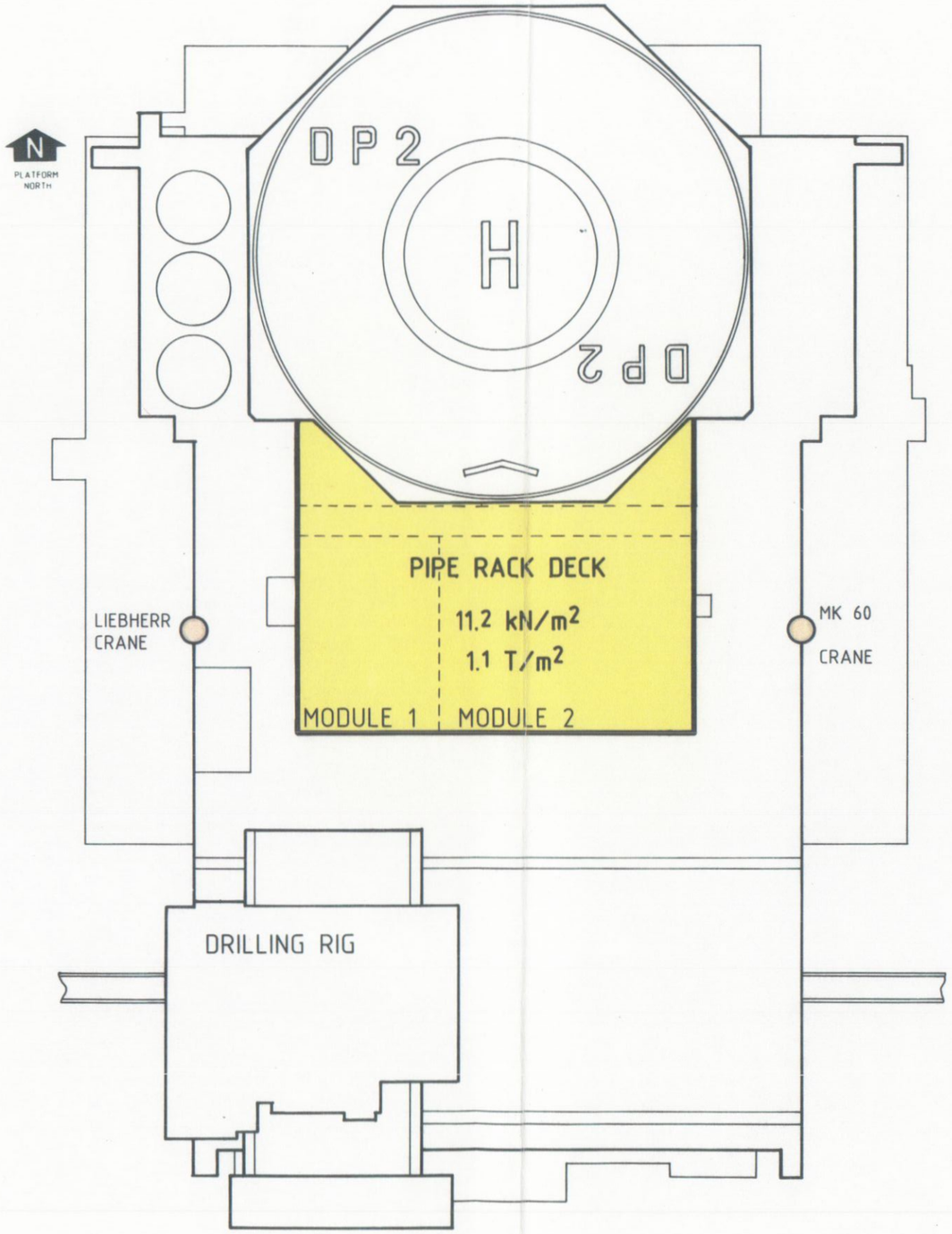


UPPER DRILLING DECK
ALLOWABLE LIVELOAD

LIFTING EQUIPMENT

1. GENERAL

Overhead travelling cranes and monorail hoists are installed in Modules 3 and 4 to assist in the servicing of equipment.

2. MODULE 3 OVERHEAD TRAVELLING CRANE

2.1 This twin rail crane has a load capacity of 5 tonnes with a longitudinal travel of 30.82m and a lateral travel of 7.56. The maximum lifting height is 4.85m from floor to hook.

2.2 The assembly comprises a trolley mounted hoist suspended under a single 'I' section beam mounted between two trolleys. The trolleys travel on a pair of rails installed under the module roof.

2.3 Power is provided by three air motors supplied from the 10 bar plant air system, one each for the hoist, longitudinal and lateral travels.

3. MODULE 4 OVERHEAD TRAVELLING CRANE

3.1 This crane is installed below the Pump Room roof in Module 4 upper level. The principal use of the crane is for the installation and removal of the firewater pumps. Access to the Pump Room lower level is via removable hatches in the upper level floor.

3.2 The maximum capacity of the crane is 12 tonnes with a longitudinal travel of 3.84m and a lateral travel of 4.15m. The maximum lifting height is 5.06m from floor to hook.

3.3 The crane assembly comprises a trolley mounted hoist suspended on a traverse beam; the beam is supported at both ends by trolleys which travel on twin rail beams installed below the Pump Room roof.

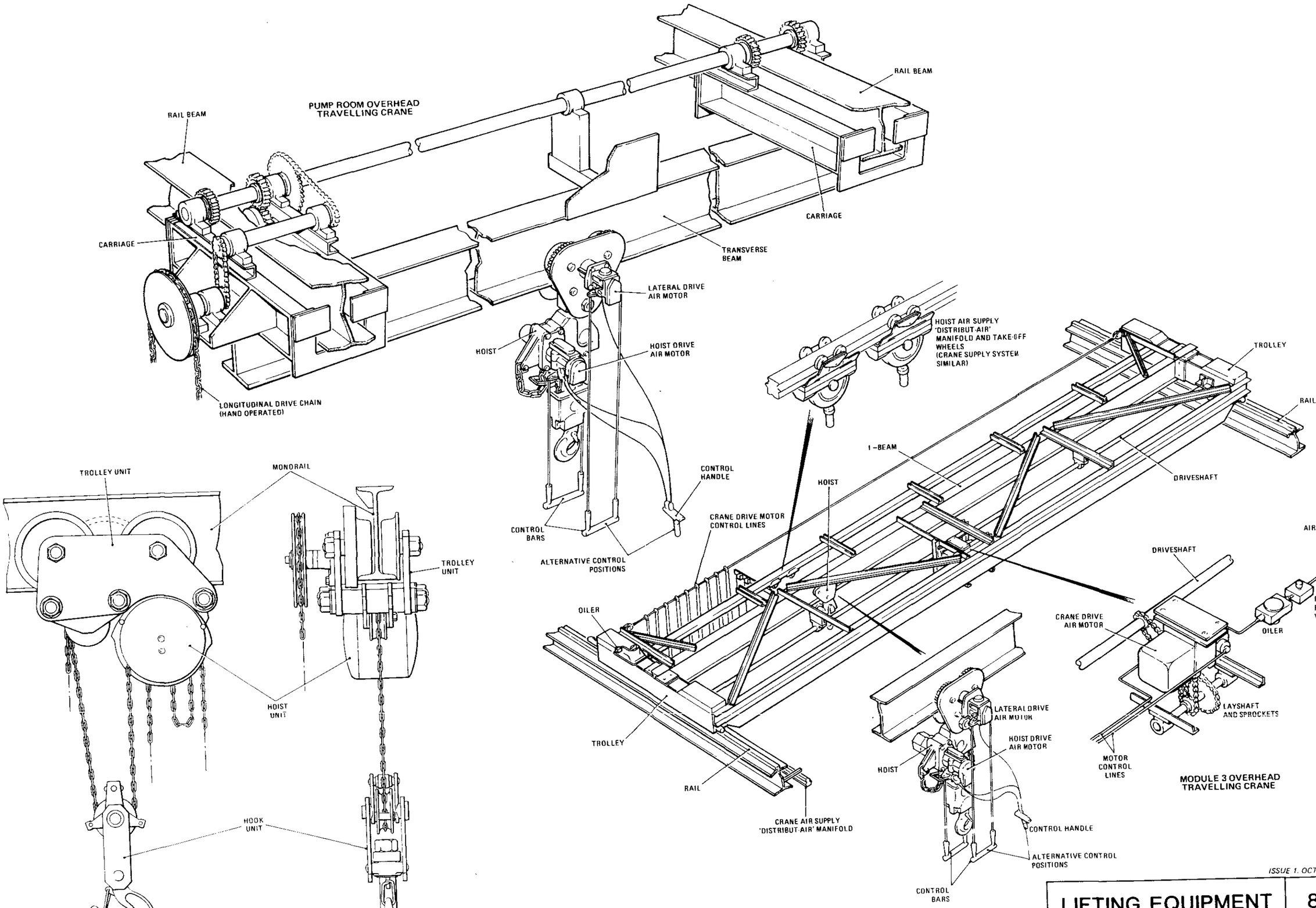
3.4 Power for the hoist and hoist trolley lateral movement is provided by two air motors supplied from the 10 bar plant air system. Longitudinal movement is achieved manually.

4. MODULE 4 MONORAIL HOISTS

4.1 Two 1 tonne capacity, hand operated, trolley mounted chain hoists are provided in the Compressor Room to facilitate servicing.

4.2 The hoists are each mounted on runways 5.25m long, suspended under the Compressor Room roof.

4.3 The maximum lifting height is 2m, floor to hook.



ISSUE 1. OCTOBER 1980

LIFTING EQUIPMENT	8.2

R.O.V. - SUPPORT FOUNDATIONS

1. GENERAL

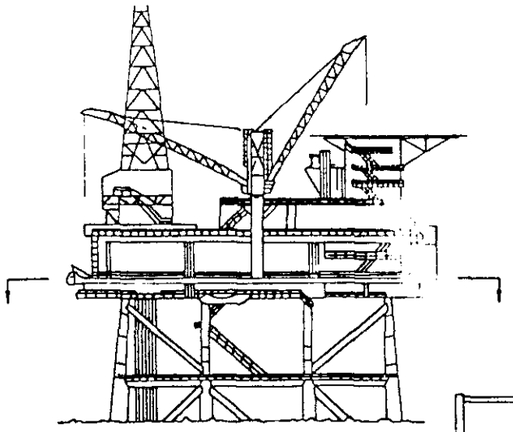
There are two positions for R.O.V - inspection on the jacket. In each position there is installed a crane foundation for this equipment.

2. WEST SIDE

The foundation is situated on Module 2 production deck.

3. EAST SIDE

The foundation is situated on Module 3 production deck.



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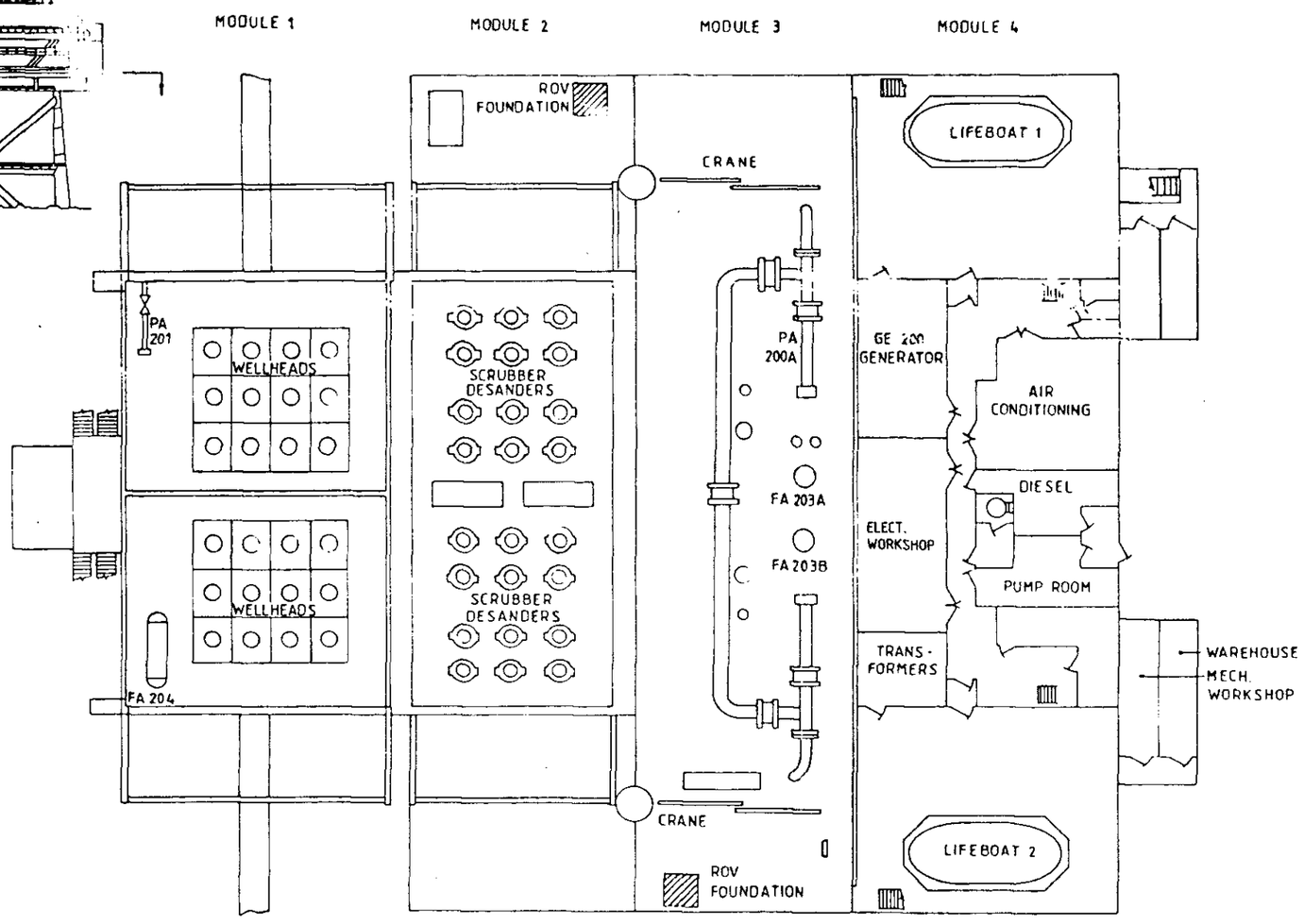


PLAN VIEW OF MODULES

PLATFORM NORTH

ISSUE 2, AUG. 1991

R.O.V. SUPPORT FOUNDATIONS

Production Deck

8.

BULK HANDLING SYSTEMS

1. SOFT WATER

Soft water is discharged from supply vessels to platform storage via flexible hoses and a 3in fill line from the boat landing. The water is stored in soft water storage tank FB210 which has a capacity of $50m^3$ and is located in the support frame below Module 4.

2. GAS OIL

2.1 Gas oil is discharges from supply vessels to platform storage via flexible hoses and a 2in fill line from the boat landing. The oil is pumped into gas oil storage tank FB 205 which has a capacity of 50 m^3 and is located in the support frame below Module 4.

2.2 A 2in valved offtake from the storage tank enables the tank contents to be discharged to a supply vessel via slop oil pump GA204.

3. METHANOL

Methanol is supplied to the platform in $9m^3$ capacity transportable tanks. From theses tanks the methanol is gravity fed to methanol storage tank FB100 which has a capacity of $50m^3$ and is located in the support frame below Module 4.

4. SLOPS REMOVAL

4.1 Slops from the process equipment and deck spillage are collected in slops storage tank FB214 located in the support frame below Module 4.

4.2 The slops storage tank is emptied as required using slop oil pump GA204 which discharges via a 2in line and flexible hose into a supply vessel.

OVERLOAD PROTECTION FOR MK - 60 CRANES

1 GENERAL

Crane safe model 88b is manufactured by Reg-Tek process-Teknikk A/S in Norway. Crane safe is an overload protection system, using a static data memory for storage and generation of the crane's load moment curve.

2 DESCRIPTION

The crane safe system consists of the following main components:

- Pendulum potentiometer for measurement of the outreach.
- Load cells for measurement of tload in the hook.
- Electronic unit with an indicator panel

CHAPTER 9

COMMUNICATIONS

CONTENTS

DIAGRAMS

RADIO LINKS

1. GENERAL

The main radio communication to shore (UK and Norway) for the whole Frigg Field is from Platform QP via a tropospheric-scatter or satellite communications system, as indicated on Diagram 9.1. Platform DP2 is linked with QP by an undersea communications cable with an alternative microwave link. However, in order to comply with the Norwegian regulations which require certain direct radio communication systems on Platform DP2 itself, independent marine and air radio equipment is also installed. The Radio Room is located on the 4th Level of LQ.

2. DESCRIPTION

2.1 Equipment

2.2.1 The radio and associated equipment is located as follows:

(a) In Radio Cabin:

Transmitter/receiver, Dancom R408	VHF/FM radio-telephone(Ship)
Portable transmitter/receiver	VHF/AM Aeromobile (Air)
Telerad, RBT 2050	Radio beacon
Autronica 24V battery charges	
Transmitter/receiver, Becker GS 2010	VHF/AM radio Aeromobile
Teleprinter, Philips Pact 220	

(b) In Battery Box (beside the Radio Cabin)

24V, 200 Ah lead acid battery Type 17E, 200M

(c) In Telemetry Room (in addition to telemetry equipment):

Telephone exchange
Microwave equipmnet/Multiplex equipment

(d) In each lifeboat:

Transmitter/Shipmate RS 8000	Emergency boat VHF radio-telephone
JOTRON TRON-1C' radio beacon	

(e) In trim room: Pamex Stentophon Exchange

2.1.2 The JOTRON 'TRON-1C' in the lifeboats is a self contained radio beacon which transmits at 250mW on two frequencies, 121.5 and 243MHz. The beacon floats upright when placed in the water and starts transmitting automatically. It contains its own sealed non-rechargeable battery which has a shelf life of three years.

2.1.3 Telex facilities are provided via QP to shore.

2.2 Inter-Platform Links

2.2.1 The link between DP2 and QP is normally by submarine cable with a microwave link available as a standby.

2.2.2 Associated with each cable/microwave link is a multiplex unit which combines (or separates) the telemetry, data, telephone and interphone signals that use the link. There is also a switching unit at each end, which automatically diverts the signal to the radio path if the cable link should fail. Reversion from radio to cable, however, must be carried out manually unless the radio path fails, in which case reversion to cable is automatic. An override switch can be used to lock the system to the radio path regardless of its state.

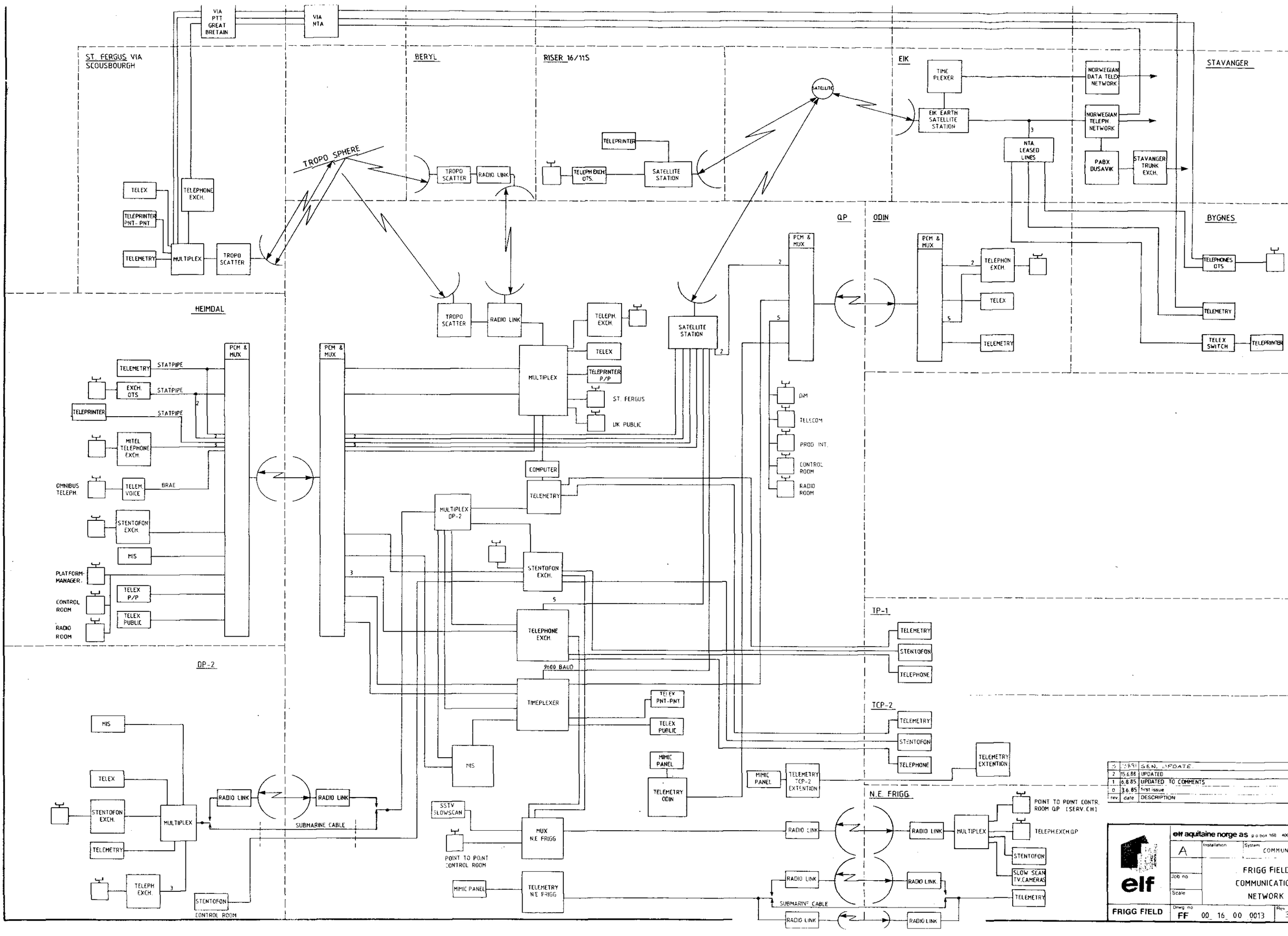
2.3 Platform-To-Shore Links

Communications to the shore, Norway or the UK, are made from QP and are covered in Section 8.1 of the QP Manual.

2.4 Power Supplies

2.4.1 The 24V dc supply for radio equipment is supplied by an 'Autronica' transformer/rectifier, fed at 220V ac from MCC switchboard A and supported by a 24V lead acid battery.

2.4.2 The main VHF lifeboat set operates from the boat's 12V battery which is kept charged by a charger permanently in the boat. When the boat is hoisted inboard the charger is plugged by hand into a 220V ac gas tight socket at the boat station to trickle charge the battery. The plug is automatically released when the boat is lowered.

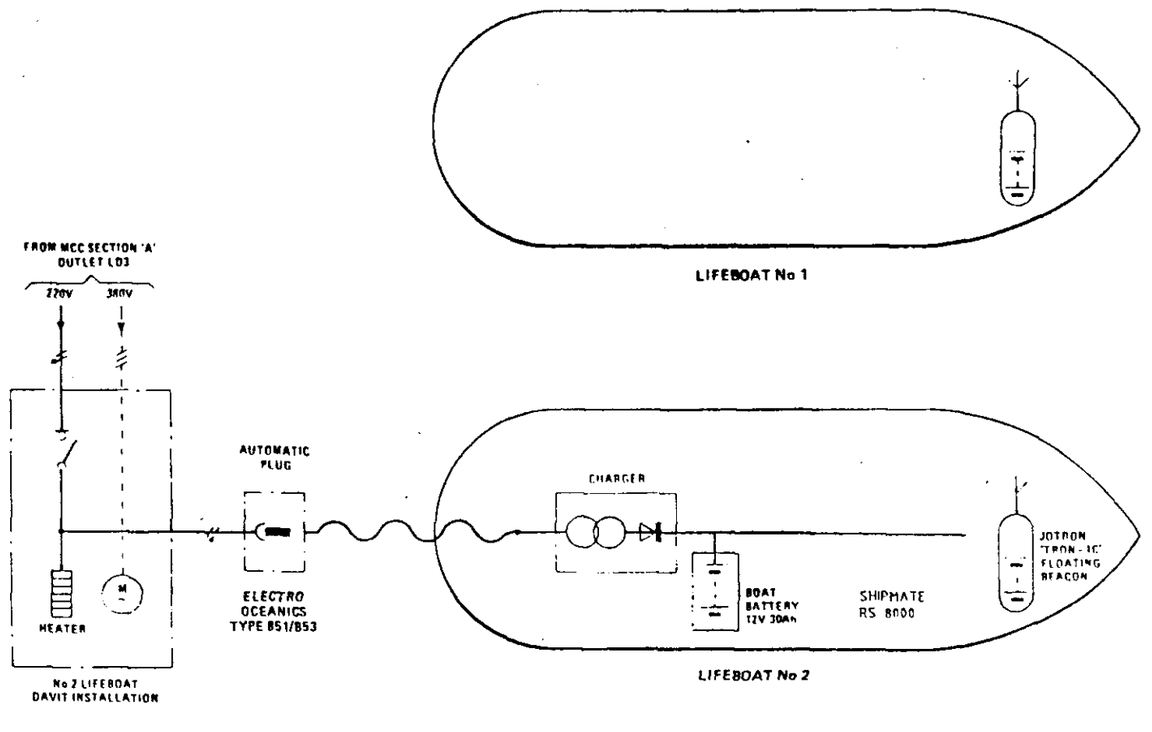


rev.	date	DESCRIPTION	by	app
3	1991	GEN. UPDATE		
2	15.6.88	UPDATED	ERY	SR
1	6.8.85	UPDATED TO COMMENTS	LHW	
0	3.6.85	first issue	LHW	

elf aquitaine norge as p.o box 168 4001 Stavanger

Installation	A	System: COMMUNICATION
Job no		FRIGG FIELD COMMUNICATION NETWORK
Scale		
FRIGG FIELD	Drwg no FF 00_16_00_0013	Rev 3

Sheet 1.1


LIFEBOAT No 1
FROM MCC SECTION 'A'
OUTLET L03
220V
380V
AUTOMATIC
PLUG
CHARGER
JOTRON
'TRON-1C'
FLOATING
BEACON
BOAT
BATTERY
12V 30Ah
SHIPMATE
RS 8000
HEATER
M
ELECTRO
OCEANICS
TYPE 851/853
No 2 LIFEBOAT
DAVIT INSTALLATION
LIFEBOAT No 2

TELEPHONE SYSTEM

1. GENERAL

1.1 The exchange telephone system is common to all four main platforms comprising the Frigg Field. Platforms QP and TP1 form a network having a common exchange in QP, the telephones in TP1 being outstations from this exchange.

1.2 TCP2 has its own exchange which is connected by four trunk lines to the QP exchange by cable via bridges and TP1 to QP.

1.3 The detached platform DP2 has its own exchange, but is connected by three tie-lines to the central QP/TP1/TCP2 system via a submarine cable link, with an alternative microwave link if the cable should fail.

1.4 In addition to the above, two dedicated telephone sets on NEF FCS are coupled via the UHF link to QP. One to a dedicated telephone set in the QP control room, one to the QP exchange.

1.5 The full telephone network is shown in block form in Diagram 8.1 where its position in relation to other inter-platform communications is shown.

2. DESCRIPTION

2.1 Exchanges

2.1.1 The principal automatic exchange on QP is a Mitel SX200. The exchange has a maximum of 208 lines available for interval, inter-platform and satellite communication with Norway. A second exchange, Mitel SX10, is provided to be used with the UK tropospheric - scatter radio link.

2.1.2 The exchanges on DP2 and TCP2 are Mitel SX100 exchanges. These have a maximum of 104 lines each for internal or inter-platform communication.

2.2 Instruments

Both wall-mounted and desk type telephone instruments are provided, the latter being used in most offices and living accommodation. Wall-mounted types are, wher necessary, enclosed for use in a Division 1 area.

2.3 Shore Links

2.3.1 The 208 line main exchange is also used for satellite communication with Norway (Stavanger), for which five trunk lines are provided between the exchange and the satellite earth station on QP.

2.3.2 Through this satellite link it is possible to speak to subscribers anywhere on the Norwegian public network. Telex, telewriter and facsimile services are also available through this link.

2.3.3 Radio communication with the UK (St Fergus) is through the Mitel SX10, to which are connected 10 additional telephone instruments exclusively for this service. In addition, there are telephones for point-to-point connection to St Fergus (not through the exchange), and also five telephones for direct link with the UK public telephone network (not through the exchange). All are multiplexed with telex, telewriter and telemetry services and are passed to St Fergus either by direct troposcatter, or alternatively by line-of sight microwave to Beryl and thence by Beryl's troposcatter to St Fergus. See Section 9.1

2.3.4 There are telex and telewriter links between Platform QP and Norway, and between QP and UK, using the same satellite and troposcatter radio links as the telephone uses. At the Stavanger and St Fergus terminal the telex links can be extended into the Norwegian and UK public telex networks.

2.4 Power Supplies

This dc power for the QP exchanges is derived at 380V ac from the MCC via distribution board DB28, which supplies 220V single-phase (phaseto-neutral). This is taken to a local transformer/rectifier which converts it to 48V dc. A battery floats on the dc side and has sufficient capacity to maintain the whole telephone system operational for 24 hours after complete loss of ac supply.

INTERCOM SYSTEM

1. GENERAL

1.1 A powered Intercom System, type Pamex, independent of all the network connects all the control rooms and most of the offices and main living rooms of all five platforms, comprising the main Frigg Field, and the Field Control Station of the satellite North East Frigg Field. This is installed primary for operational Use.

1.2 A main exchange is installed on QP with satellite exchanges on TCP2 and DP2. This enables all subscribers to call any extension required. The system enables conference groups to be set up and messages to be given via the general call facility. The subscriber can use the system as a loudspeaking voice controlled system or push to talk, or as a full Duplex private telephone system, except for the exproof extension which are voice controlled or push to talk.

1.3 The NEF FCS Intercom system, type Pamex is coupled to the main QP exchange via one channel in the NEF UHF communications link.

1.4 The full Intercom network is shown in block form in diagram 8.1, where its position in relation to the other inter platform communication is shown.

2. DESCRIPTION

2.1 All control rooms and exproof extensions on the complex are directly connected to the QP exchange. The control room on DP2 is directly connected to the QP exchange via the submarine cable. The satellite exchange on TCP2 is connected to the QP exchange via cable. The satellite exchange on DP2 is connected to the QP exchange via the multiplex systems normally using the submarine cables, but changing over to microwave Radio links on failure of the cable channel.

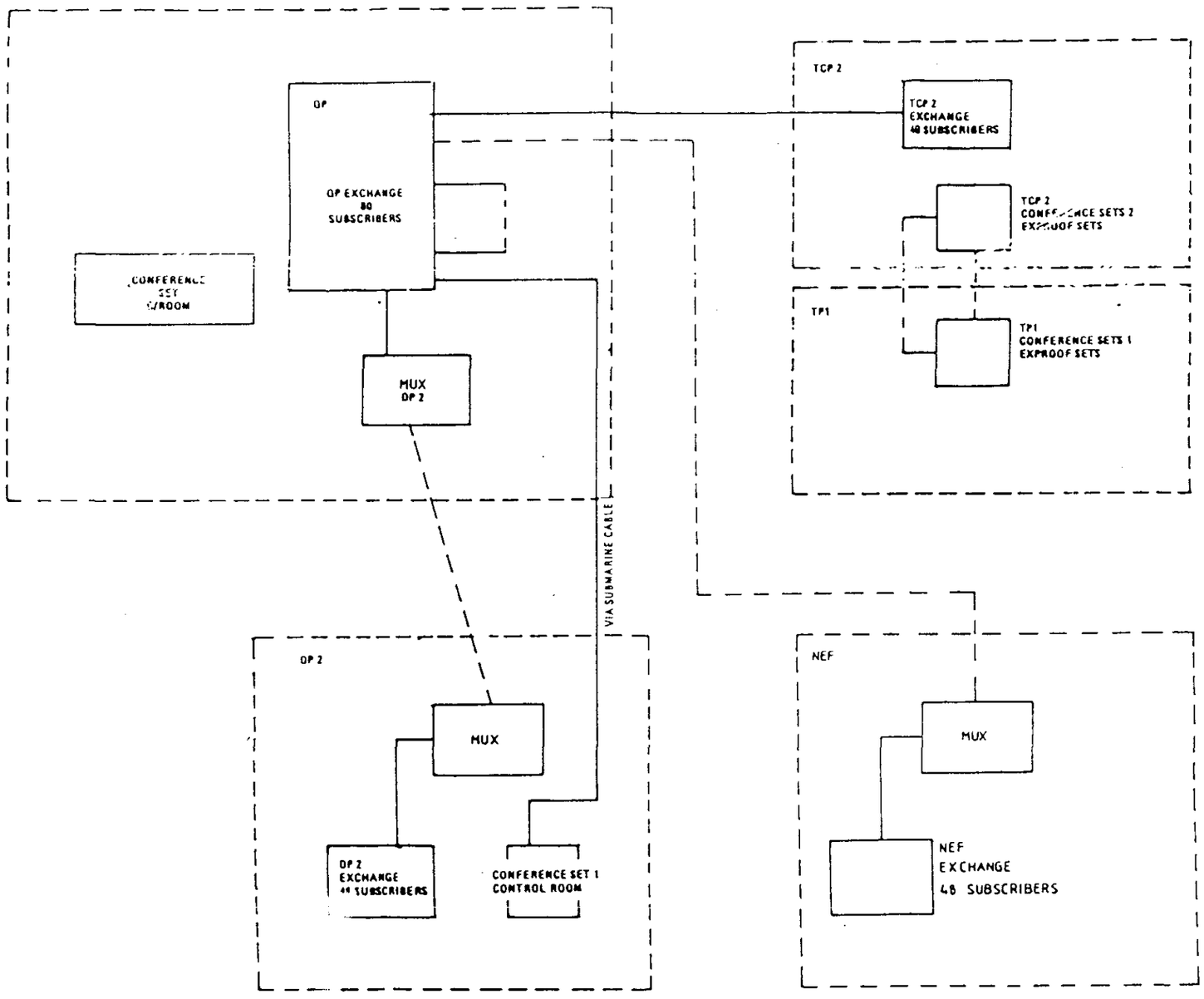
2.2 The main exchange on QP is for a maximum of 80 subscribers and 8 speech channels. The exchange is expandable to 240 subscribers. The satellite exchanges located on TCP2 and DP2 are for a maximum of 48 subscribers and 4 speech channels.

2.3 The QP exchange is capable of setting up a conference group with the TP1 interface room1, TCP2 inteface room, control room compression, DP2 control room and QP control room. Further more, the QP control room, QP radio, QP rig office and QP telecom are capable of using the general call facility to give messages.

2.4 The satellite exchanges are powered so that they will have power cut off in case of a shutdown. The QP exchange will cut off power to all sets connected to it on the treatment platforms in case of a shutdown on the treatment platforms. Exproof sets are not included in this cut off.

2.5 The normal desk sets are loud speaking with a built-in loud speaking mode, with high background noise or the push to talk button can be used for normal functions. The set can also be used as a full duplex telephone set by lifting the control unit from the loudspeaker and using it as a handset.

2.6 The exproof sets are wall-mounted with a built-in mike and external loudspeaker. The sets can be used as a semiduplex voice controlled set or, in case of high background noise for normal function, a push to talk mode.


TCP 2
TCP 2
EXCHANGE
40 SUBSCRIBERS
TCP 2
CONFERENCE SETS 2
EXPROOF SETS
TP1
TP1
CONFERENCE SETS 1
EXPROOF SETS
OP
OP EXCHANGE
80
SUBSCRIBERS
CONFERENCE
SET
CONTROL ROOM
MUX
OP 2
VIA SUBMARINE CABLE
OP 2
MUX
OP 2
EXCHANGE
44 SUBSCRIBERS
CONFERENCE SET 1
CONTROL ROOM
NEF
MUX
NEF
EXCHANGE
40 SUBSCRIBERS

PUBLIC ADDRESS AND ALARM SYSTEMS

1. GENERAL

1.1 A Public Address (PA) System, comprising microphones, two amplifiers and loudspeakers distributed throughout the production and drilling modules, is provided for broadcasting instructions and information throughout the platform.

1.2 It is activated by microphones in the Platform Control Room and the Radio Room, or from Platform QP via a radio-telephone link. Access to the system can also be gained through any telephone on the platform.

1.3 Alarm horns actuated by pushbuttons and a relaying system are located throughout the platform in the Production and Drillers Modules. The G.P.A. is actuated either manually or automatically by widely distributed detectors.

2. DESCRIPTION

2.1 Public Address

2.1.1 The main items, namely the two PA amplifiers and the power supply inverter, are situated in special PA containers in the village.

2.1.2 The amplifiers are normally powered at 220V ac from the MCC, but on failure of this, an alternative supply from the 48V dc system through an inverter supplied from the 48V dc system is automatically switched in. This will supply power for 24 hours further operation.

2.1.3 In areas of high noise, attention is drawn by the use of blue lights which flash while an announcement is being made. The flasher unit is powered at 48V dc.

2.2 General Platform Alarm (G.P.A)

2.2.1 An intermittent horn signal is emitted on detection of fire/gas (lst. level gas) by various automatic detection systems, or when any of the alarm pushbuttons are pressed. In high noise areas there are also red flashing light s which operate with any of the above alarms.

2.2.2 A separate buzzer system gives local warning in the relevant area before the discharge of Halon in the event of fire.

2.3 Muster (Panic) Alarm

A continuous horn signal is initiated by pushbuttons in the Control Room, Radio Room and the Drill Floor Console. Upon the sounding of this alarm personnel muster and prepare to abandon the platform. The actual order to abandon platform is given verbally either over the PA system or by the person in charge at the muster station.

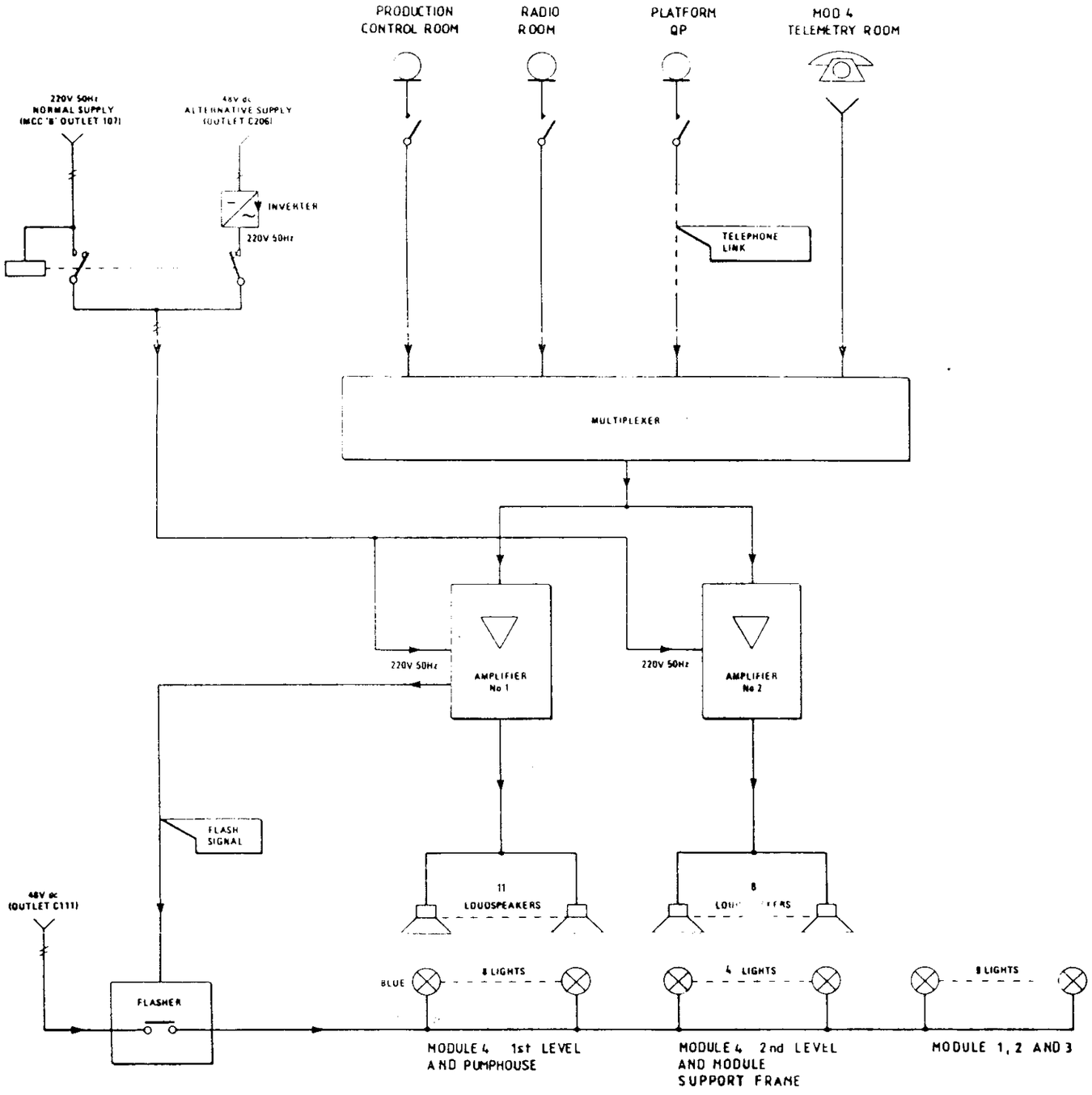
2.4 General Alarm System

2.4.1 In addition to the above horn alarms there is a general alarm system fitted throughout the production modules and deck areas. It is pneumatic and is actuated by alarm buttons located in key areas throughout the platform.

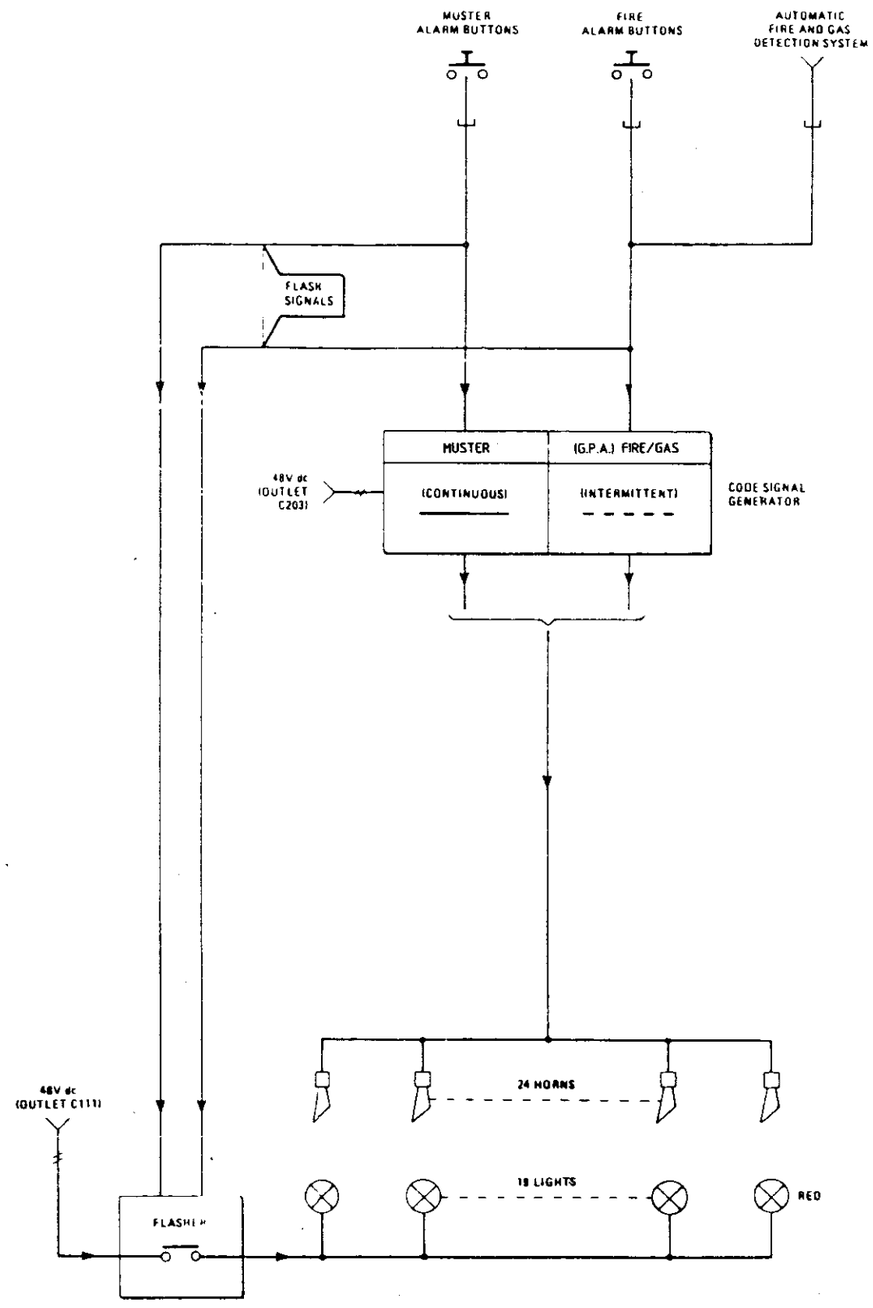
2.4.2 It causes a bell to ring in the QP Control Room with annunciation in the Platform Control Room. The operator in the latter can send assistance to the area where the button was pressed.

2.4.3 The bells are powered from the platform 48V dc system

PUBLIC ADDRESS



ALARM HORNS



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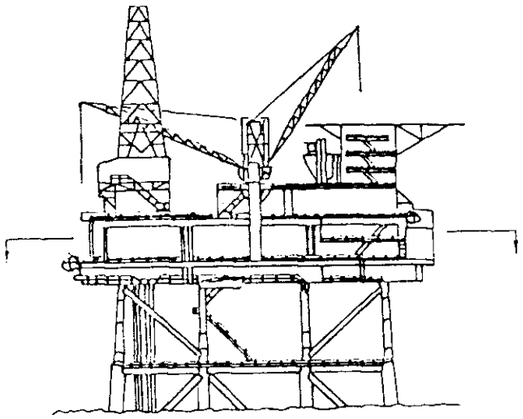
PUBLIC ADDRESS AND ALARM SYSTEM	9.4



KEY VIEW

KEY

PUBLIC ADDRESS LOUDSPEAKER

PLATFORM NORTH

SHALE SHAKERS
DEGASSER
DESILTERS
DESANDER TANK
MUD DITCH
SETTLING TANK
POWER PACK
BOP ACCUMULATOR UNIT
COOLING PUMPS
FOAM UNIT
WAREHOUSE
SEA WATER TANK
FUEL TANK
POTABLE WATER TANK
MUD CONTAINER PL.FORM
MUD PUMP
CENTRIFUGAL MUD PUMPS
MUD PUMP
FIRE PUMP GEN
DRUM
INDUSTRIAL WATER PUMPS
WASHING PUMPS
EMERGENCY GENERATOR
SEA WATER TANK
INDUSTRIAL WATER TANK
MUD TANK
MUD TANK No 1
MUD TANK No 2
MUD TANK No 3
SWITCHBOARDS
MECH W/SHOP
SWITCH BOARDS
MUD TANK
WARE HOUSE
ENGINES
ELECTRIC W/SHOP
CHANGE ROOM CONTAINER
ELECT WARE-HOUSE
CEMENTING UNIT
AIR COMP
MUD POWER PACK AGITATOR
FOAM UNIT MUD ROOM

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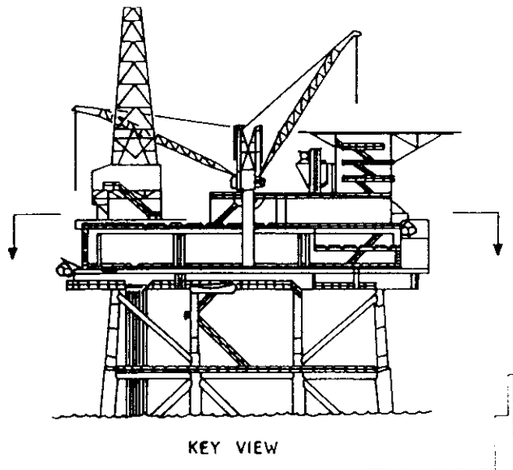
PUBLIC ADDRESS
Lower Drilling Deck

9.4.1



KEY VIEW

PLATFORM NORTH N

AT MEZZANINE DECK EL. 36.690

SAND REEL

TOOLS RACK

DRAWWORKS

DRILL LINE SUPPORT

RAMP

ROTARY DRIVE

SET BACK

DOG HOUSE

POWER PACK FOR POWER SWIVEL

MUD PREPARATION

MUD SACKS STORAGE

STORE LAGER

SURGE TANK

AIR COMP.

EMERGENCY GENERATOR AND FIRE PUMP DAY TANK

AIR RECEIVER

CONDENSATE TANK

AIR COMPRESSORS

AIR VESSELS

AIR DRYER

MODULE 4

KEY
PUBLIC ADDRESS LOUDSPEAKER

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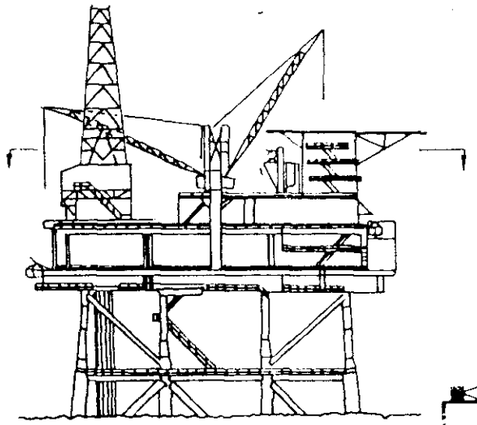
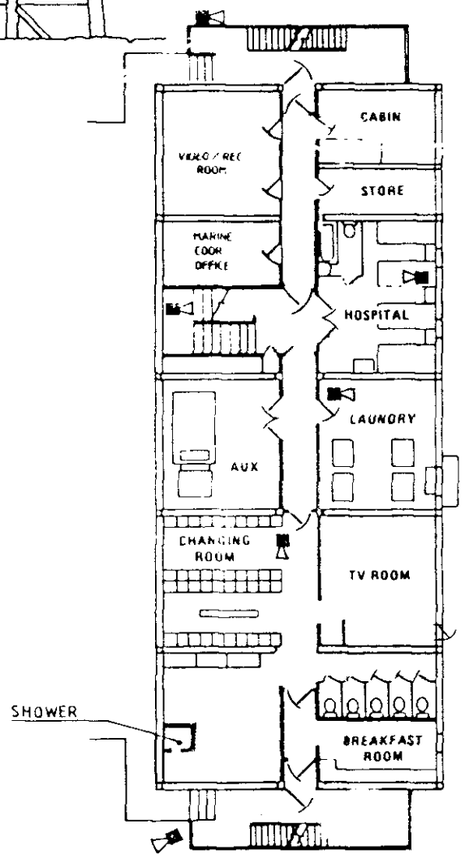
PUBLIC ADDRESS
Intermediate Drilling Deck

9.4.2

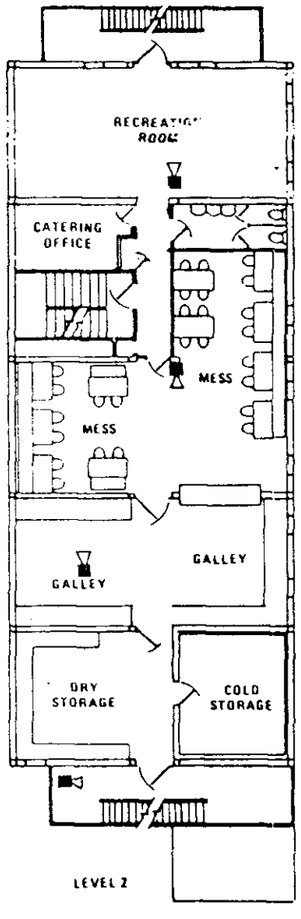


KEY VIEW

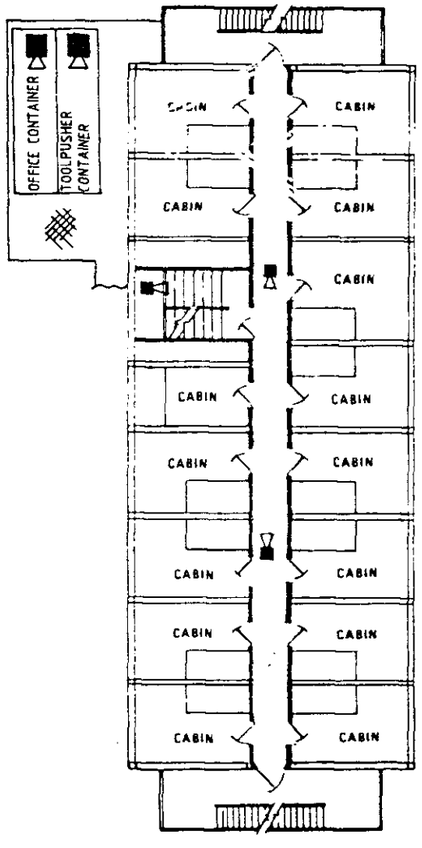
PLATFORM NORTH



LEVEL 1

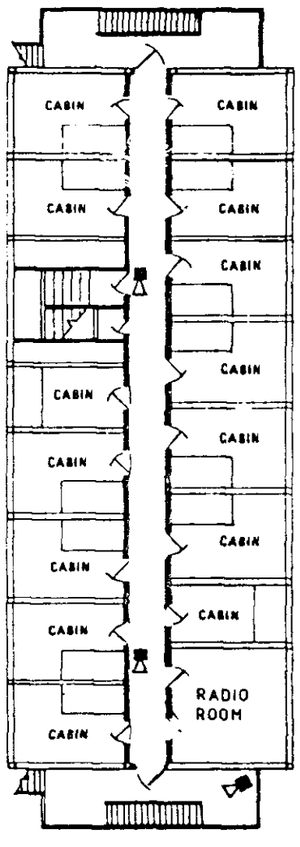


LEVEL 2



LEVEL 3

NOTE: LEVEL 3 IS 'MOTHBALLED' AND NOT IN USE.



LEVEL 4

KEY
PUBLIC ADDRESS LOUDSPEAKER

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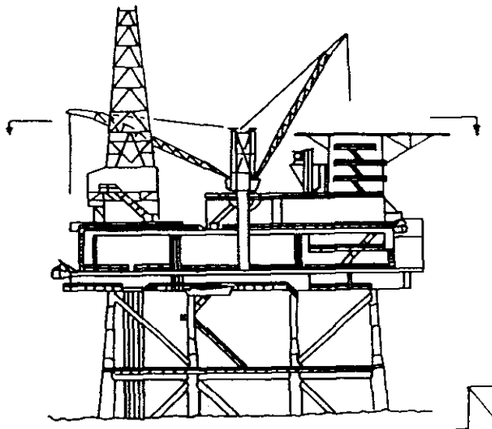
PUBLIC ADDRESS
Living Quarters

9.4.3



KEY VIEW

MK60
MAINT.
PL.FORM

EL 55.80

CONTAINER

CONTAINER

DP2

DP2

EL. 41.20

LIEBHERR
MAINT.
PL.FORM

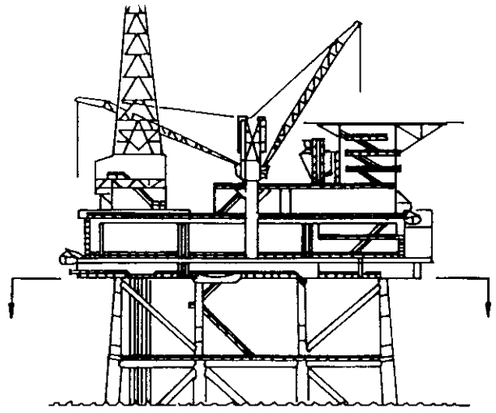
KEY

PUBLIC ADDRESS
LOUDSPEAKER

ISSUE 2, OCTOBER 1988

PUBLIC ADDRESS
Upper Drilling Deck

9.4.4



KEY VIEW

PICK UP BOAT

FOR DETAILS OF
PUMP HOUSE AND
STORAGE TANK AREA
SEE DIAGRAM 10.4.3

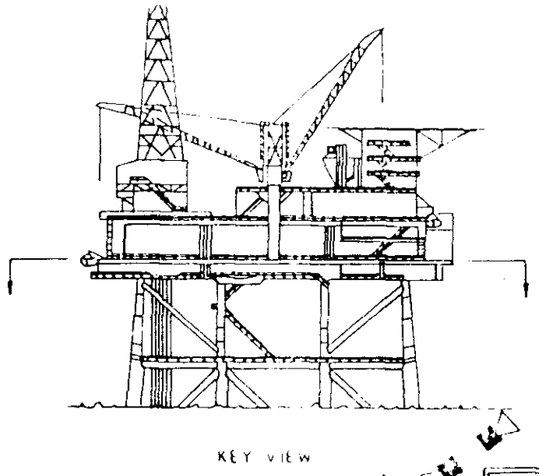
KEY

PUBLIC ADDRESS LOUDSPEAKER

ISSUE 2, NOVEMBER 1991

PUBLIC ADDRESS
Deck Support Frame

9.4.5



KEY VIEW

MAINTENANCE AREA

LIFEBOAT 1

PLATFORM NORTH

AUXILIARY ELECTRICAL GENERATOR ROOM

AIR CONDITIONING ROOM

FIRE PUMP ROOM

ELECTRICAL WORKSHOP

FIRE PUMP ROOM

INSTRUMENT AND MAINTENANCE SHOP

MECH. WORK-SHOP

WARE-HOUSE

MAINTENANCE AREA

LIFEBOAT 2

MODULE 1

MODULE 2

MODULE 3

MODULE 4 FIRST LEVEL

KEY

PUBLIC ADDRESS LOUDSPEAKER

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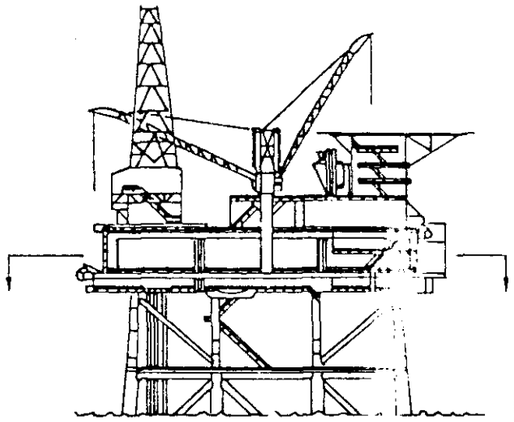
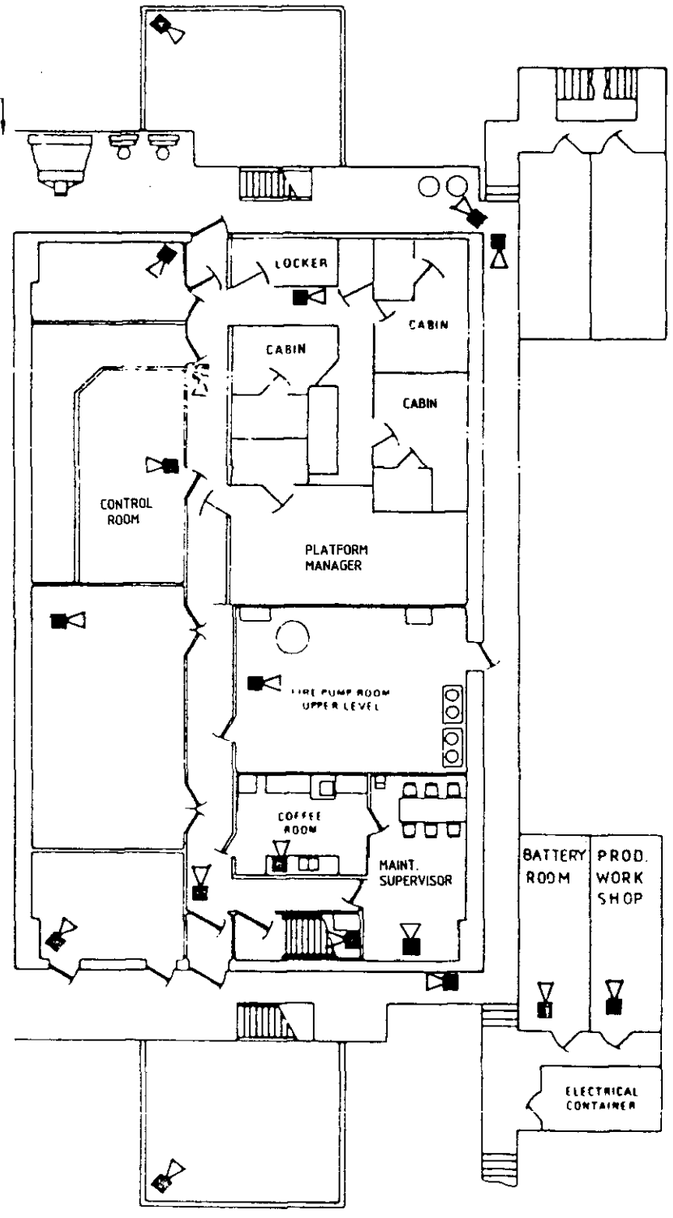
PUBLIC ADDRESS

Production Deck

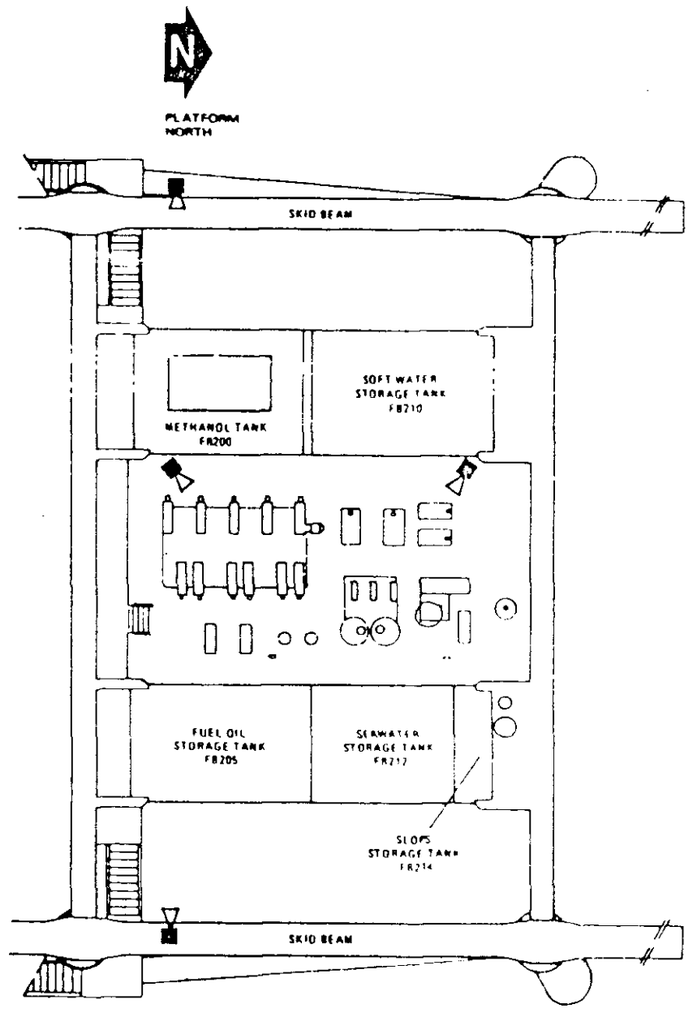
9.4.6



KEY VIEW



MODULE 4 SECOND LEVEL



PUMPHOUSE AND STORAGE TANKS

KEY
PUBLIC ADDRESS LOUDSPEAKER

ISSUE 2, AUG. 1991

PUBLIC ADDRESS Module 4 Second Level and Pumphouse	9.4.7

NAVIGATIONAL AIDS

1. GENERAL

1.1 Navigation equipment installed on Platform DP2 complies with the requirements of the UK Department of Trade (Marine Division) January 1976 'Standard Marking Schedule for Offshore Installations', and with 'Regulations for Marking of Production Platforms' issued by the Norwegian Coast Directorate.

1.2 The following navigational aids are installed:

(a) Navigation lights.
(b) Obstruction lights.
(c) Foghorns.
(d) Helideck lights.

2. DESCRIPTION

2.1 Navigation Lights

2.1.1 Navigation lights are installed as follows:

(a) A main and a secondary white light are fitted at the north west and at the south east corners of the platform, the main above the secondary in a 'Biform'lantern at each position. The main light, which has an output of 14000 candelas, is visible at a range of 15 miles in clear weather. The secondary light has an output of 1400 candelas and is visible at a range of 10 miles in clear weather. The lantern is fan cooled.

(b) Subsidiary red lights are fitted at the north east and south west corners of the platform at Production Deck level. They are visible at a range of three miles in clear weather.

2.1.2 All navigation light lanterns are fitted with rotating lampholders, which automatically replace a lamp if it burns out. The main white lights have two place holders, and an alarm is given in the Platform Control Room when the first lamp has failed. The secondary white and subsidiary red lights have six place holders, but no alarm is given when they have failed.

2.2 Obstruction Lights

2.2.1 To warn aircraft of projections above the platforms, red obstruction lights are installed on the drilling derrick and the cranes. The vertical distance between lights is a nominal 10m. There are also obstruction lights at the south west and south east corners of Module 2, where it projects beyond Module 1.

2.2.2 The two burner booms are floodlit from the platform, each by two 400W floodlights.

2.3 Foghorns

2.3.1 Foghorns are mounted at the north east and south west corners of the platform. They have an audible range of two miles in still weather. Their acoustic frequency is nominally 645Hz, but to avoid an interference sound pattern they are turned 10Hz apart.

2.3.2 Each foghorn is a vertical array of eight separate transducers.

2.3.3 There is no separate secondary foghorn system. The requirements of the Department of Trade in this respect are met as follows. If the power supply should fail, back-up batteries can maintain the horns in operation for up to four days. If the control unit should fail, a standby unit is automatically brought into operation. Any three transducers together have a range exceeding half a nautical mile. For the range of the whole foghorn to fall below this minimum requirement, at least six separate transducers would have to fail simultaneously - a very unlikely occurrence. Alarm indications are given in the Platform Control Room for all these failures. The 'secondary' system, therefore, makes use of the main foghorns.

2.4 Helideck Lights

The Helideck perimeter is marked by a circle of 32 flush mounted lights, alternately blue and yellow and nominally 3m apart. Each yellow light is rated at 40W and each blue at 25W.

2.5 Power Supplies

2.5.1 All navigational aids except the Helideck perimeter lights take their power supplies at 220V ac single phase, from MCC switchboard B, outlet B045. The Helideck supply comes from MCC switchboard A at 380V from outlet A51. The yellow and blue lights are fed by two separately fused circuits at 110V ac through a local 380/110v transformer. This power supply is battery supported.

2.5.2 Each pair of white navigation lights, main and secondary in a 'Biform' lantern, are fed via local separately mounted 220/120V transformer. The transformer output is fed into the white lantern base to the circuit illustrated.

2.5.3 During normal operation the main white light operates at 120V ac via the flasher unit, while the two 12V, 50Ah batteries are kept charged by the battery charger. If the main light should fail, either because of a supply interruption or because both lamps have burned out, the control unit switches the 12V dc supply to the secondary white light after a delay of one minute. The batteries can maintain the full load for a minimum of four days.

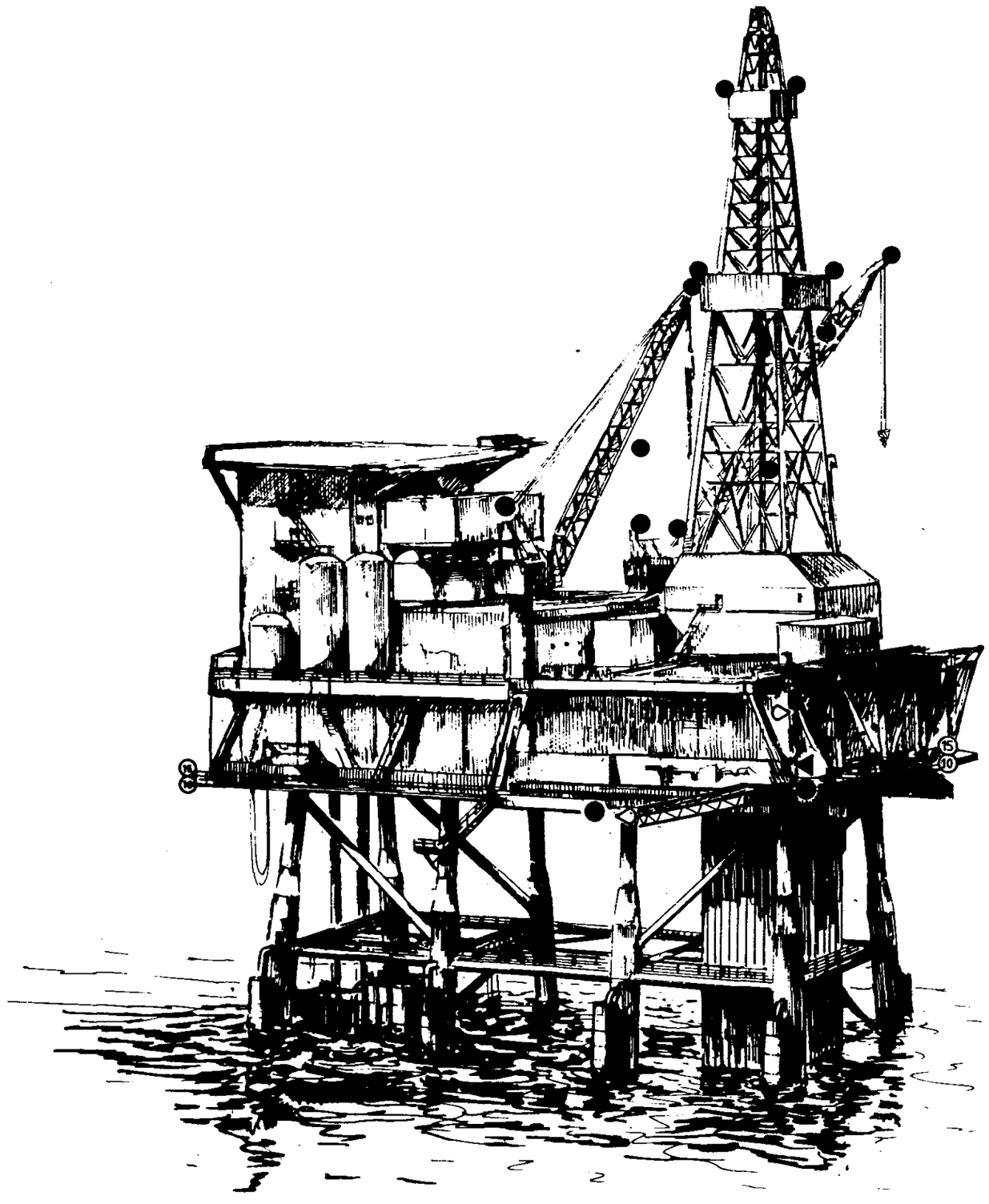
2.5.4 The subsidiary red light and the foghorn at each station share a 12V dc power supply produced in the foghorn base. The 220V ac input from MCC switchboard B is fed to a transformer/rectifier (battery charger), the 12V dc output of which feed the lamp flasher unit and the foghorn control units. If the supply should fail the supporting batteries take over the load without interruption and can carry it for a minimum of four days.

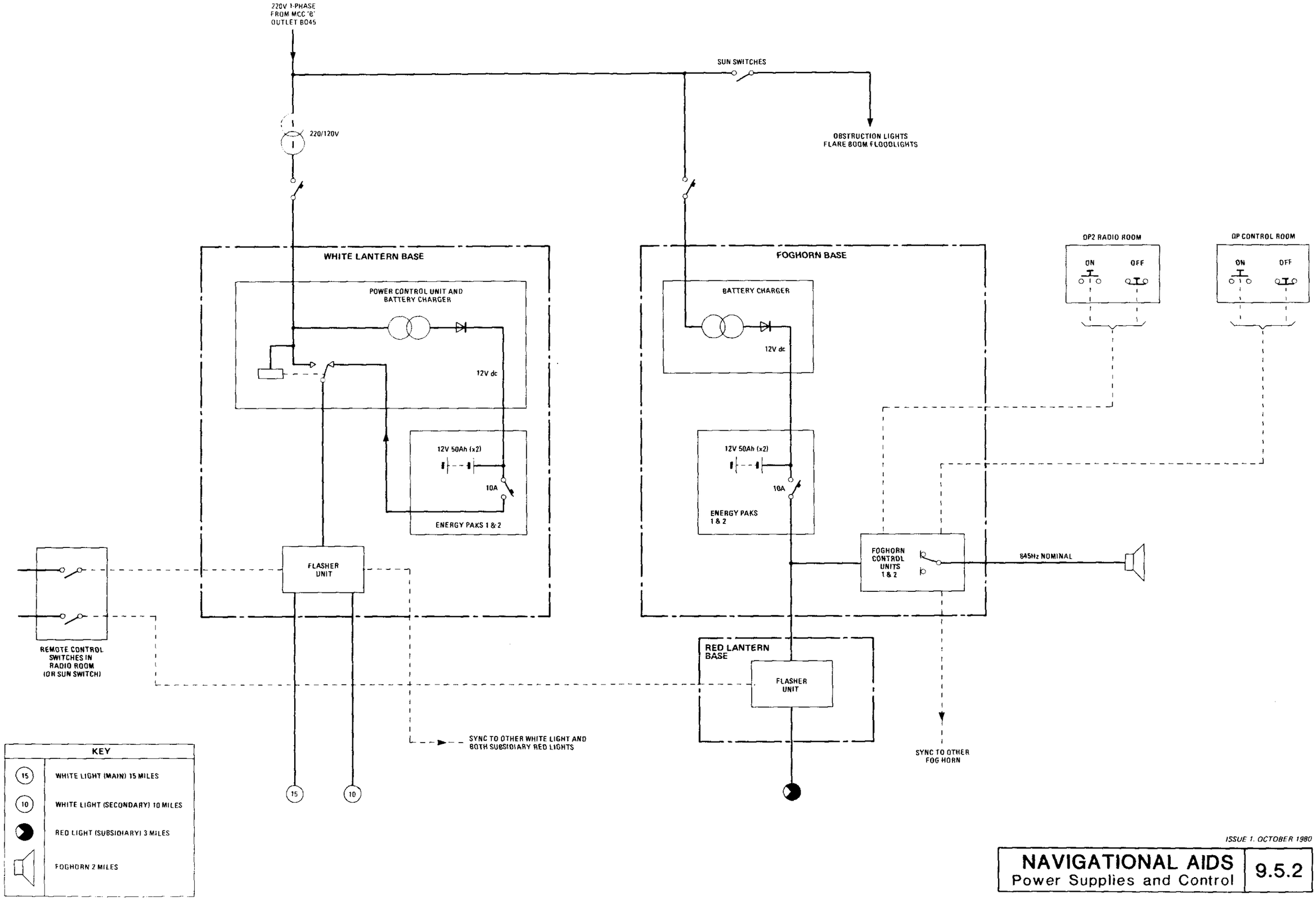
2.6 Navigational Aids Control

2.6.1 Four flasher units, one for each pair of white lights and one for each subsidiary light, are interconnected by control circuits so that all the platform navigation ligths flash the morse letter 'U' in synchronism every 15 seconds.

2.6.2 The foghorns are switched on from the Control Room or remotely from the QP Control Room. The 12V dc power supply is fed via a foghorn control unit at each station. All the control units, duty and standby at each station, are connected by control circuits so that both foghorns sound the morse letter'U' in synchronism every 30 seconds. The battery capacity is sufficient to maintain operation for four days, following complete loss of main power.

KEY		
(15)	WHITE LIGHT (MAIN)	15 MILES
(10)	WHITE LIGHT (SECONDARY)	10 MILES
	SUBSIDIARY (RED) LIGHT	3 MILES
	AIRCRAFT OBSTRUCTION LIGHT	
	FOGHORN	2 MILES
	BURNER BOOM FLOODLIGHT	




220V 1-PHASE
FROM MCC 'B'
OUTLET B045
SUN SWITCHES
220/120V
OBSTRUCTION LIGHTS
FLARE BOOM FLOODLIGHTS
WHITE LANTERN BASE
POWER CONTROL UNIT AND
BATTERY CHARGER
12V dc
12V 50Ah (x2)
10A
ENERGY PAKS 1 & 2
FLASHER
UNIT
REMOTE CONTROL
SWITCHES IN
RADIO ROOM
(OR SUN SWITCH)
SYNC TO OTHER WHITE LIGHT AND
BOTH SUBSIDIARY RED LIGHTS
FOGHORN BASE
BATTERY CHARGER
12V dc
12V 50Ah (x2)
10A
ENERGY PAKS
1 & 2
FOGHORN
CONTROL
UNITS
1 & 2
645Hz NOMINAL
RED LANTERN
BASE
FLASHER
UNIT
SYNC TO OTHER
FOG HORN
DP2 RADIO ROOM
ON
OFF
DP CONTROL ROOM
ON
OFF
KEY
15
WHITE LIGHT (MAIN) 15 MILES
10
WHITE LIGHT (SECONDARY) 10 MILES
RED LIGHT (SUBSIDIARY) 3 MILES
FOGHORN 2 MILES

CHAPTER 10

SAFETY

CONTENTS

CHAPTER 10

SAFETY

DIAGRAMS

OFFSHORE EMERGENCY ORGANIZATION

1. GENERAL

The muster list gives a brief description of the emergency organization, and what to be done by individuals in case of an emergency situation, types of emergency alarms and special warning/danger, distributions to lifeboats and a sketch of lifeboats/muster stations.

1.1 It is issued by the Safety Department and can be revised only by agreement with the department.

1.2 A copy of the muster list is posted at the following locations:

Corridor outside rig office	
Platform Manager's Office	Staircase in Living Quarter
Corridor outside Control Room	between 1/2 level and 3/4 level.

2. INSTRUCTION AND DUTIES

2.1 Emergency teams are established to cope with the various emergency situations.

2.2 The Platform Manager (PM) takes command in the control room/emergency center, assisted by one production operator.

2.3 The production senior operator will assist the PM in coordination of the teams and relevant emergency actions. This man will assume responsibility if the PM becomes disabled.

2.4 The fire/emergency team, is led by the sen. mechanic.
The fire/emergency team, is responsible for the immediate and direct action with regards to rescue of personnel, fire fighting, cooling etc., as well as intervention on process system. The team is also responsible for the immediate and safe technical intervention on the electrical system, fire pump operations, emergency generators and other technical interventions. Within the team are qualified members who will perform duties such as medical first aid, m.o.b. duty, helideck and lifeboat.

2.5 First aid team led by medical nurse.

The medical nurse is responsible for medical treatment and will inform the PM if assistance is required. The nurse will join the emergency team if there is no need for medical treatment.

2.6 Helicopter operations are led by the heliguard (sen. inst. tech.) who is responsible for actions related to helicopter movement. He is also a member of the emergency team.

2.7 Search team - led by the cook is responsible for checking that living quarter is clear of personnel, and report to the control room. He will then join the emergency team.

2.8 Lifeboat crews: At lifeboat #1, a team of 3, led by the sen. mechanic is responsible for safe evacuation of personnel. (Part of emergency team).

2.9 Pick-up boat crew-team of 3 led by sen. mechanic is responsible for action during "man overboard" situation. (Part of emergency team).

2.10 The platform manager is responsible for relaying information to/from the platform, and keep the account of personnel onboard.

3. ABANDON PLATFORM

3.1 The order to abandon platform will be given by the PM.

MUSTER LIST/MØNSTRINGSPLAN

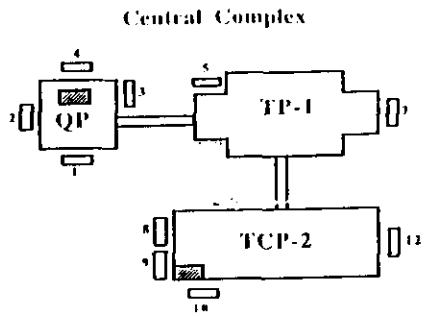
ALARMS/ALARMER:

- **GENERAL PLATFORM ALARM (GPA)/ GENERELL PLATFORM ALARM:**

  INTERMITTANT HORN
  (RED FLASHING LIGHTS IN NOISY AREAS)
  AVBRUTT LYDSIGNAL
  (BLINKENDE RØDT LYS I STØYOMRÅDEN)

- **MUSTER ALARM/ MØNSTRINGSALARM**

  CONTINUOUS HORN
  (RED FLASHING LIGHTS IN NOISY AREAS)
  KONTINUERLIG LYDSIGNAL
  (BLINKENDE RØDT LYS I STØYOMRÅDEN)



- Gas Emergency: The GPA will be interrupted (after ab. 8 sec.) and announcement given on Emergency PA.
- Fire Emergency: The GPA will be interrupted (after ab. 8 sec.) and announcement given on Emergency PA.
- Gassnødsituasjon: GPA vil bli avbrutt (etter ca. 8 sek.) og en annonsering gitt på Emergency PA.
- Brann nødsituasjon: GPA vil bli avbrutt (etter ca. 8 sek.) og en annonsering gitt på Emergency PA.

GASLEAK
Anyone detecting a gas leak shall:
- Immediately stop all work in the area and put equipment in a safe condition.
- Inform the control room.
- Evacuate to safe area.
- *Act as instructed on the PA-system.*

GASSLEKKASJE
Enhver som oppdager en lekkasje skal:
- Øyeblikkelig stanse all arbeid i området samt sikre utstyret.
- Informere kontrollrommet.
- Gå til et sikkert område.
- Følg instrukser gitt via PA-systemet.

FIRE
Anyone detecting a fire shall:
- Raise the alarm
- Without endangering himself, try to limit or extinguish the fire.

BRANN
Enhver som oppdager en brann skal:
- Gi alarm
- Forsøke å begrense eller slukke brannen dersom dette kan skje uten fare for ham selv.

GENERAL PLATFORM ALARM
- Stop work immediately and put *equipment in a safe condition.*
- Go to your allocated emergency station. (Ref. your IC-card).
- Await further instructions.

GENERELL PLATFORM ALARM
- Stans arbeidet øyeblikkelig og sikre utstyret.
- Gå til fordelt nødstasjon (Ref. ditt IC-kort).
- Avvent videre instrukser.

MUSTER ALARM
- Stop work immediately and put equipment in a safe condition
- Put on warm clothing and collect *your survival suit if time permits.*
- Go to your designated lifeboat station
- Await further instructions

MØNSTRINGSALARM
- Stans arbeidet øyeblikkelig og sikre utstyret.
- *Ta på varme klær* og hent din overlevingsdrakt dersom tiden tillater det
- Gå til den livbåten hvor du er fordelt
- Avvent videre instrukser.

SPECIAL WARNINGS/DANGERS/INSTRUCTIONS
SPESIELLE ADVARSLER/FARER/INSTRUKSER

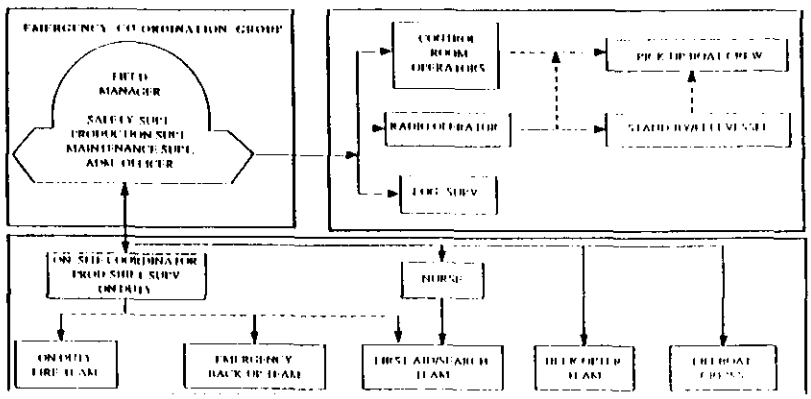
ABANDON PLATFORM
Order to abandon the platform might be given on the PA- or Emergency PA-system, by radio or other available *communicational means.*

FORLAT PLATTFORMEN
Ordre til å forlate plattformen vil bli gitt over PA-systemet eller Nød PA-systemet, over radio eller et hvilket som helst annet tilgjengelig kommunikasjonsmiddel.

MAN OVERBOARD
Anyone observing a man overboard should shout "MAN OVERBOARD", throw lifebuoy(s), raise the alarm by informing control room or radio room while keeping the man in sight.

MANN OVERBORD
Enhver som observerer en mann overbord skal rope "MANN OVERBORD", kaste livbøye(r) og slå alarm ved å informere kontrollrommet eller radiorommet mens man passer på ikke å miste mannen av syne.

EMERGENCY ORGANIZATION – NØDORGANISASJONEN



DISTRIBUTION TO LIFEBOATS – FORDELING TIL LIVBÅTENE

LIFEBOAT NO. 1	LIFEBOAT NO. 2	LIFEBOAT NO. 3	LIFEBOAT NO. 4	LIFEBOAT NO. 5	LIFEBOAT

EAN CONTINGENCY PLAN AND EMERGENCY PROCEDURES

1. GENERAL

This document establishes the procedures to be used by the Elf OIM/PM or his deputy with regard to fixed structures, working barges, mobile rigs, supply and standby vessels in the Frigg Field and/or transport units to and from the Frigg Field. It itemises the procedures to be used in the even of the following major incidents

a) Fire/Explosion
b) Escape of gas or condensate(Hydrogen Sulphide/Riser Rupture/ Pipelines/Methanol
c) Helicopter crash on platform
d) Helicopter ditch
e) Damage to auxiliary vessel
f) Man overboard
g) Loss of well control
h) Abandon platform/Re-entry
i) Mooring failure
k) Uncontrolled drift/Drifting objects
l) Storm or severe weather
m) Deterioration Sea worthiness
n) Diving accident/HRV procedure
o) Medical emergency
p) Oil spill/Condense leak at sea
q) Radiation leak (loss of or damage to radioactive sourcep
r) Criminal act
s) Sea-bed movement
t) Collision
u) Structural failure
v) Failure of equipment affecting safety
w) Emergency on NEF and EF

AREA CLASSIFICATION

1. GENERAL

1.1 Platform areas have been evaluated for risk using the Institute of Petroleum Model Code of Safety Practice, Drilling and Production in Marine Areas (2nd Edition Part 8, 1972 Section 8) and the latest revision of the Institute of Petroleum Electrical Safety Code as a basis.

1.2 A dangerous zone is one in which there exists or may exist a dangerous atmosphere. These areas are classified Zone 1 and Zone 2 as defined below:

ZONE 1 An area in which a dangerous atmosphere is likely to occur under normal operating conditions

ZONE 2 An area in which a dangerous atmosphere is only likely to occur under abnormal operating conditions.

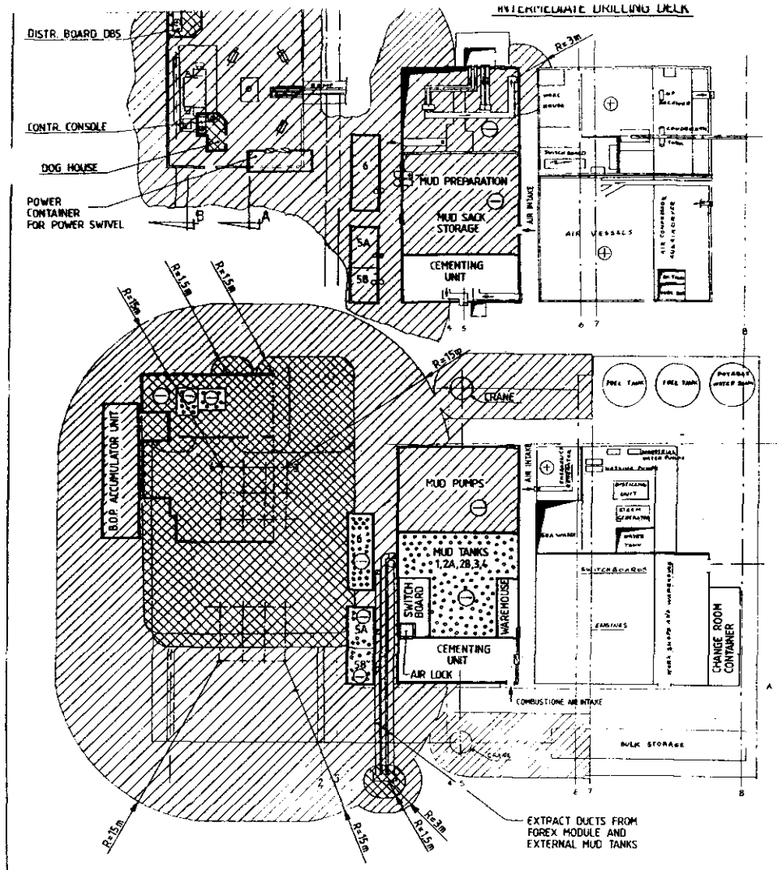
1.3 Areas not included in a dangerous category as above are termed Unclassified, and are achieved as follows:

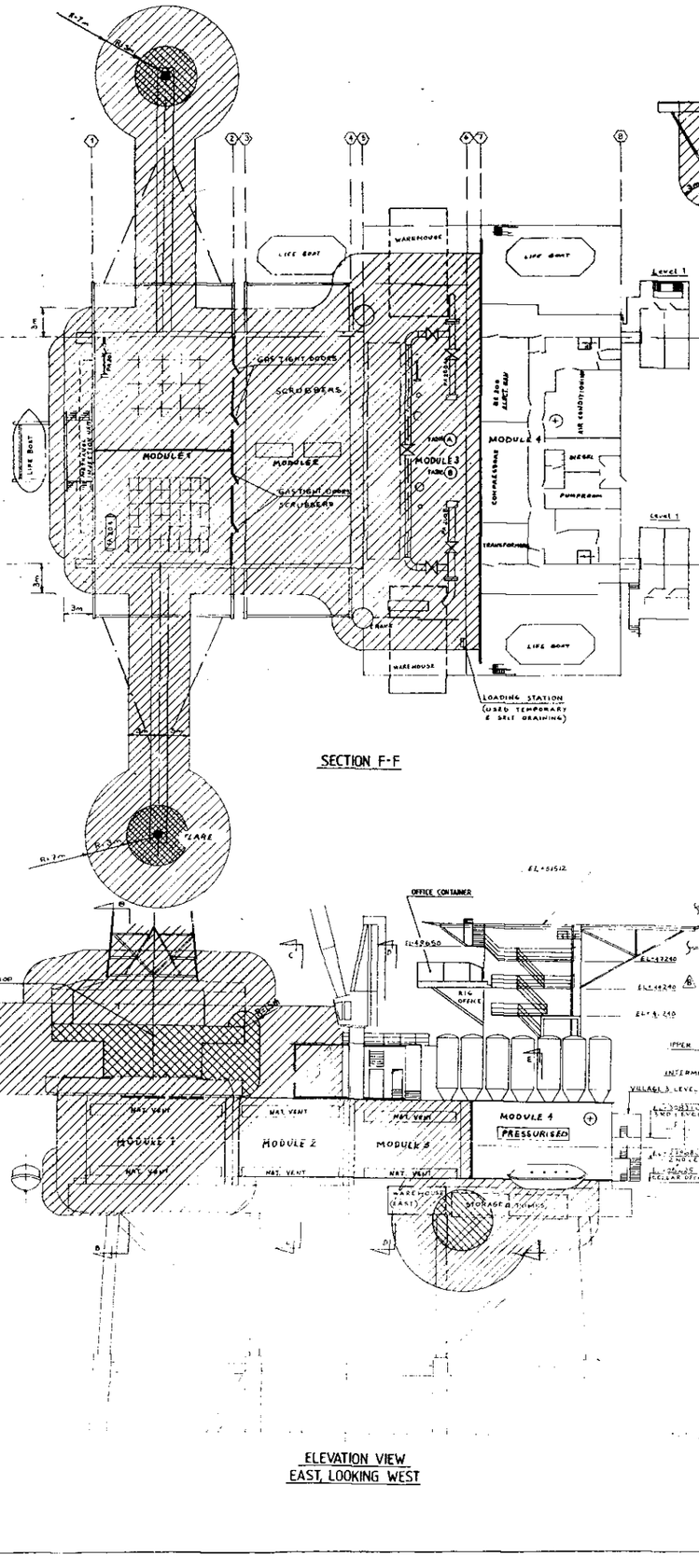
(a) Pressurising an enclosed space with air taken from an unclassified area.

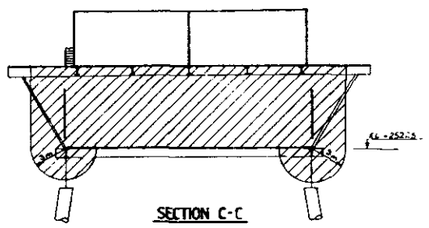
(b) Defining exterior areas which re considered to be an adequate distance from any possible gas or vapour escapes so that the gas or vapour will be dispersed before reaching this area.

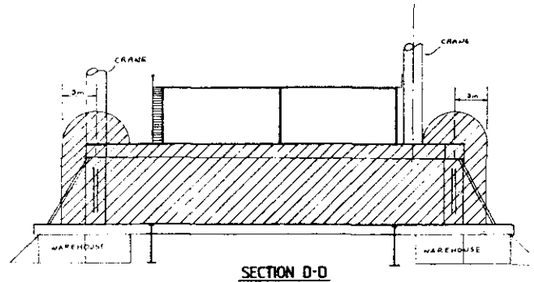
(c) Force vented areas which have a high rate of ventilation with air coming from an unclassified area.

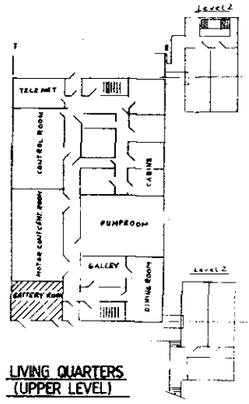
NOTE! A pressurised or force vented area may be classified as zone 1 in case of ventilation failure.

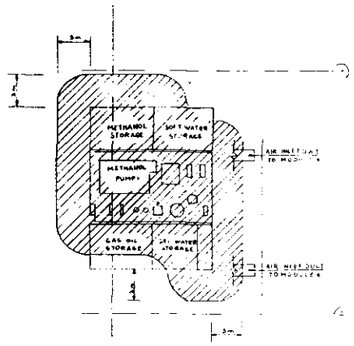


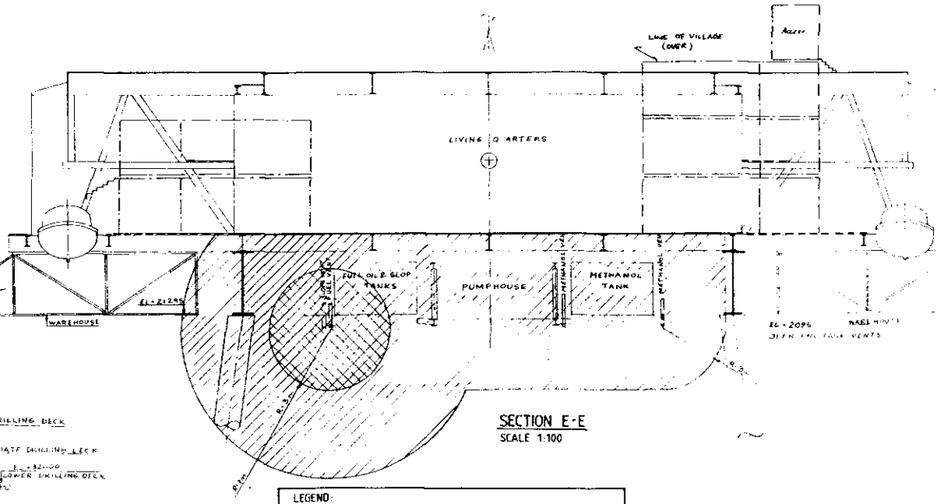


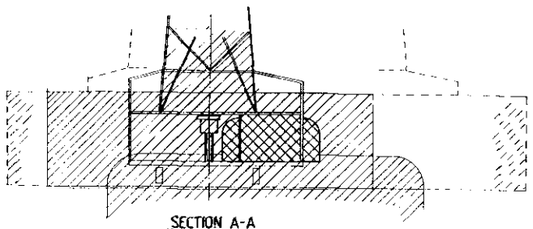


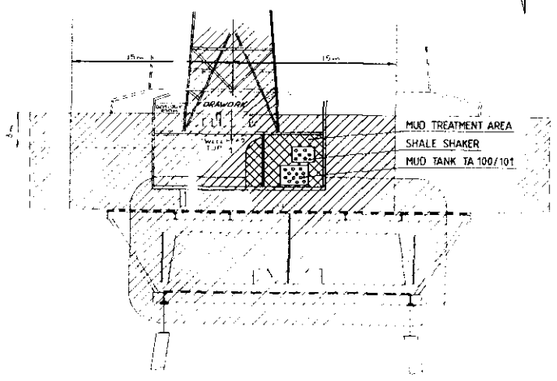












LEGEND:

- DOOR
- SELF CLOSING DOOR
- SOURCE OF HAZARD
- ZONE 1 AREA
- ZONE 2 AREA
- ⊕ INTERNAL PRESSURE HIGHER THAN ATMOSPHERIC PRESSURE
- ⊖ INTERNAL PRESSURE LOWER THAN ATMOSPHERIC PRESSURE
- GASTIGHT BULKHEAD

REFERENCE DRAWINGS:

1. 161A 6004 HAZARDOUS AREAS
2. EF 74780050 AREA CLASSIFICATION

NOTES:

1. INFORMATION COMPLIES WITH I.P. CODES
2. THIS DRAWING SUPERCEDES PREVIOUS 1st STAGE DWG. No. FF 83 32 00 503

DATE	REV.	DESIGNATION	DRAWN BY
27.6.88	10	AS BUILT	
19.02.88	9	TO SUIT AS BUILT	
3.08.87	8	AS BUILT NUMBERED AREAS 32	
3.08.87	7	AS BUILT SECTION BB	
27.5.87	6	MUD & ACID METHANOL VALVE ROOM	
16.5.87	5	MUD TANKS	
4.12.86	4	ADDED PARTITION WALLS	
4.12.86	3	ISSUED FOR APPROBATION	

elf petroleum norge a/s

A

FRIGG FIELD-DP2
CLASSIFICATION AREAS
SECOND STAGE
DRILLING & EXPLOITATION

FF-83-23-00-9010

AUDIBLE AND VISUAL ALARMS

1. GENERAL

1.1 Audible and visual alarms provide platform personnel with information on the safety status of the platform.

1.2 Audible alarms are broadcast by the public address system

1.3 Visual alarms are provided in selected platform areas; the visual alarms comprise:

(a) Red lights which flash when the G.P.A. and muster alarm is sounded.

(b) Blue lights which flash when the public address system is in operation.

(c) Red light outside individual compartments which is illuminated when Halon has been released into the compartment.

2. DESCRIPTION

2.1 Alarms are of the following types:

(a) Alert Signal - verbally broadcast over the public address system, following a two tone alert signal (can be abandon platform or man overbaord).

(b) Muster Alarm - signalled by a continuous tone broadcast via the P.A. system.

(c) 'GPA' - (General Platform Alarm) - signalled by an intermittent tone broadcast via the P.A. system as a series of sound pulses of one second duration, each sound pulse separated by a period of silence of one second duration. This will be followed by an announcement over the P.A. system. A general platform alarm is initiated by fire or gas detection.

2.2 Automatic priority ranking of the alarms is provided as follows:

(a) Priority 1 - Alert Signal.
(b) Priority 2 - Muster Alarm
(c) Priority 3 - General Platform Alarm.

2.3 The highest priority alarm will override any other alarm, eg. if a G.P.A. is being broadcast and a Muster Alarm is initiated, the Muster Alarm will override. The public address system is distinct in that an alert signal will override any alarm tone for a period of 10 seconds.

3. INITIATION OF ALARMS

3.1 A Muster Alarm may be initiated manually from any of the platform alarm control panels and from certain safety panels. A G.P.A. may be initiated manually by operation of any of the fire alarm pushbuttons located at various points throughout the platform or automatically by operation of the fire/gas detection system. A G.P.A. may also be initiated by operation of certain platform shutdown systems. An Alert Signal may be initiated at QP Control Room or at the Platform Control Room.

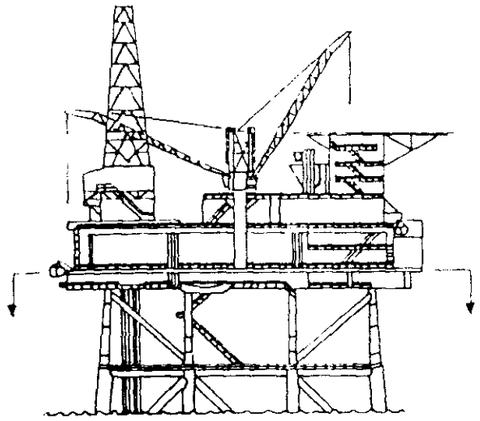
3.2 Muster and G.P.A's may be cancelled by operation of a cancel pushbutton at the panel at which the alarm was initiated.

4. ACTION TO BE TAKEN ON HEARING ALARMS

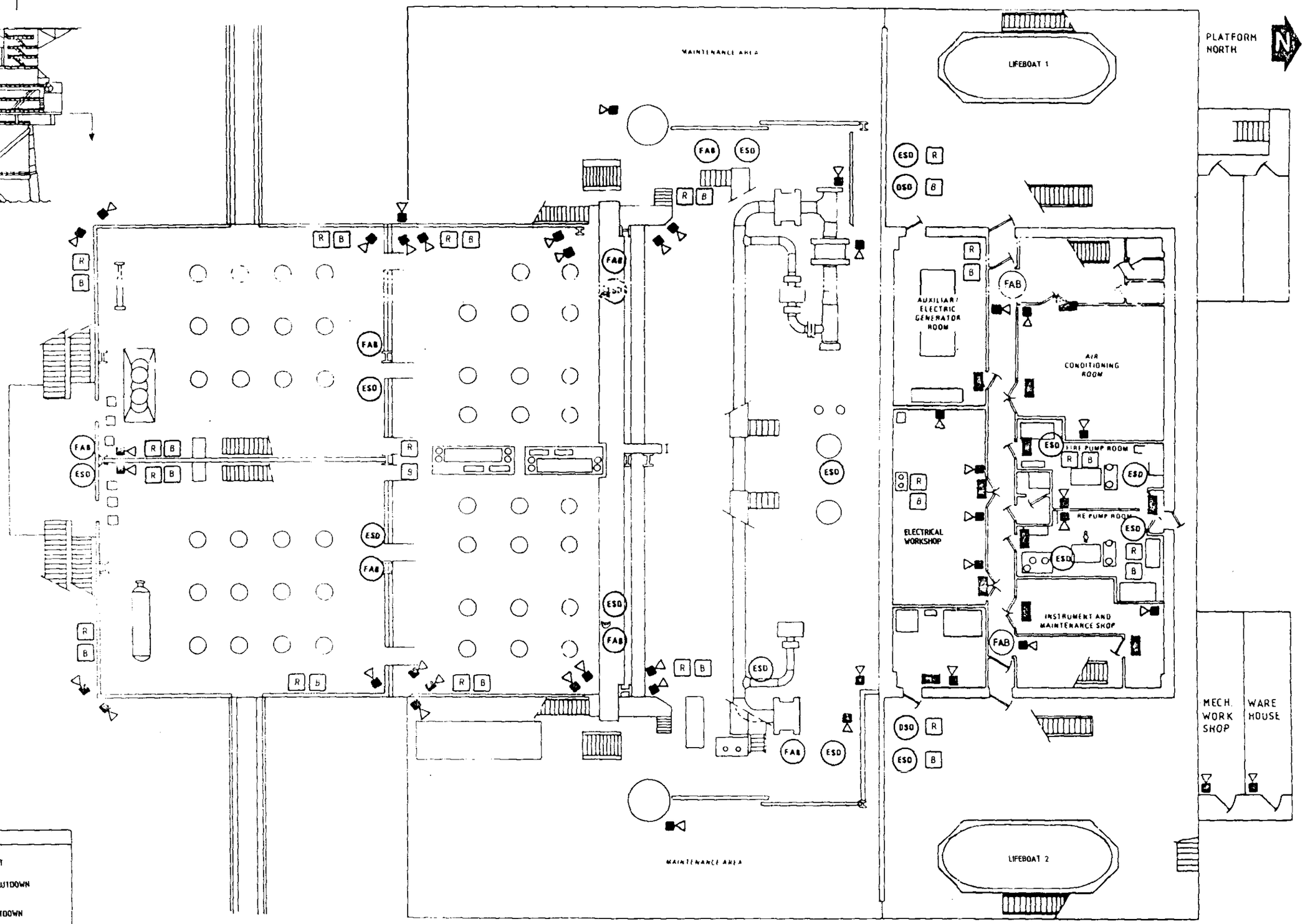
4.1 Alert Signal - all personnel to act as instructed over the P.A. system

4.2 Muster Alarm - all personnel proceed to their lifeboat stations and await further instructions.

4.3 G.P.A. (Fire or Gas Alarms) - all personnel assigned to a fire party are to gather their designated equipment and assemble at their fire stations. All other personnel are to proceed to their allocated emergency station (refer to I.C. card) and await further instructions given over the P.A. system.



KEY VIEW



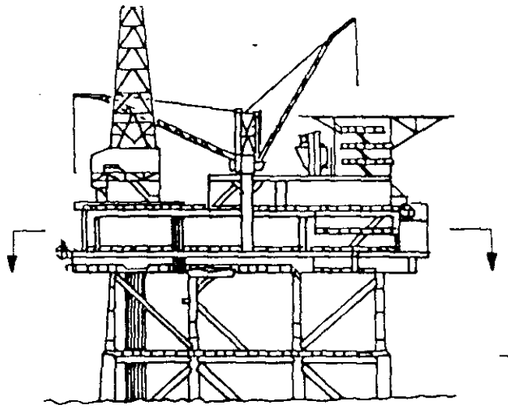
KEY

- R — RED OR BLUE FLASHING LIGHT *eg. RED*
- ESD — EMERGENCY SHUTDOWN PUSHBUTTON
- DSD — DISASTER SHUTDOWN PUSHBUTTON
- FAB — FIRE ALARM PUSHBUTTON / DELUGE MANUAL VALVE
- FIRE ALARM FLASHING LAMP

ISSUE 5, AUG. 1991

AUDIBLE AND VISUAL ALARMS
Production Deck

10.4.1



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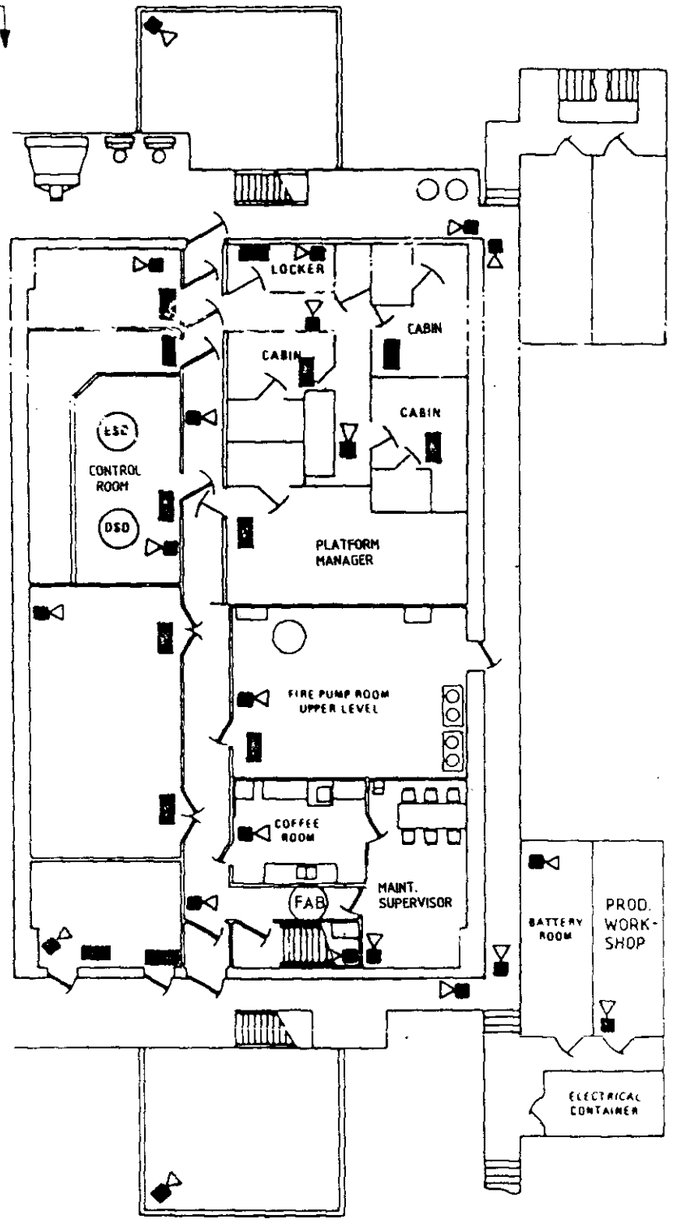
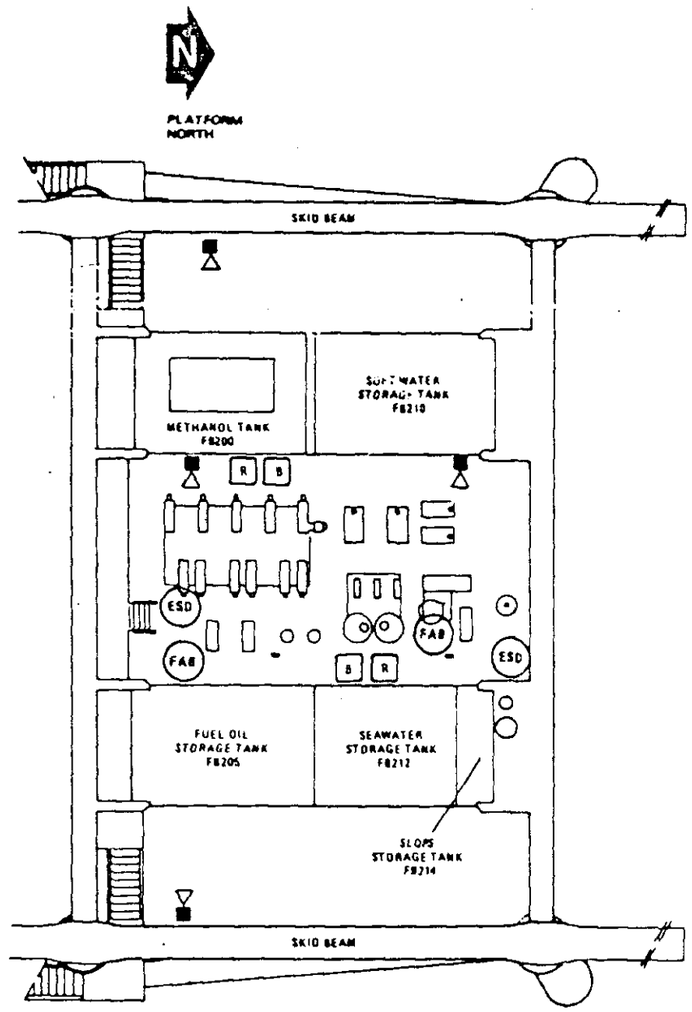


MODULE 4 SECOND LEVEL



PUMPHOUSE AND STORAGE TANKS

KEY

- R — RED AND BLUE FLASHING LIGHT eg. RED
- ESD — EMERGENCY SHUTDOWN PUSHBUTTON
- DSD — DISASTER SHUTDOWN PUSHBUTTON
- FAB — FIRE ALARM PUSHBUTTON (DELUGE MANUAL VALVE)
- FIRE ALARM FLASHING

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AUDIBLE AND VISUAL ALARMS
Module 4 Second Level and Pumphouse

10.4.

SHUTDOWNS

1. GENERAL

1.1 The major objectives of the DP2 shutdown system are:

(a) Prevention of injury to personnel.
(b) Prevention of damage to equipment.
(c) Operation of equipment with the minimum amount of production stoppages.

1.2 These objectives are met by shutdown systems which provide for shutdown of equipment at varying levels. Five levels of shutdown are provided; these are based on the degree of danger arising from a number of emergencies.

1.3 The platform shutdown system include both Production and Drilling facilities.

2. DESCRIPTION

2.1 First Level Shutdown

2.1.1 DP2 First Level Shutdown is initiated by:

(a) Operation of any of the Field Shutdown (FSD), Disaster Shutdown (DSD) pushbuttons or manually operated valves located as follows:

(i) FSD or DP2-DSD pushbutton
QP Control Room

(ii) DSD pushbuttons or manual valves.
Platform Control Room pushbutton.
Lifeboat Stations - manually operated valves.
Radio Room - manually operated valve.

(iii) Abandon Platform button - lifeboats 1 & 2 (for isolation of rig power supply only).

(b) Detection of gas at a level of 40 percent LEL inside Module 4.

2.1.2 The effects of a First Level Shutdown are:

<u>Production</u>

(a) A complete process shutdown

(b) Loss of the 5,5kV power supply from TCP2 on the second threshold detection of gas inside Mod. 4.

(c) Loss of the 380V supply from the auxiliary generators.

(d) Simultaneous load shedding is only on the operation of the pushbuttons or manual valves. There is a delay of 30 minutes before this action takes place.

(e) The methanol and utilities pumps stop, and the ventilation systems shuts down.

(f) The fire pumps starts and the deluge valves open.

(g) The warning horns sound and warning lights flash on operation of the pushbuttons or manual valves only.

(h) The relevant alarm annunciators operate in the Platform Control Room and the QP Control Room.

(i) 48V D.C. supply shutdown (gas in Mod. 4 only).

Additional Drilling Effects:

(j) Isolating AC system, main breaker open, alternators stop.

(k) Isolating DC drilling system, generators stop.

(l) Emergency alternator A3 starts automatically when main alternators stops. This alternator gives power to emergency equipment.

2.2 Second Level Shutdown

2.2.1 DP2 Second Level Shutdown is initiated by:

(a) Operation of ESD pushbuttons or manually operated valves located as follows:
TCP2 (via QP)
QP Control Room Platform Control Room
Lifeboat Stations
Radio Room
Pushbuttons on Helideck (2 off)
Module 1 (3 off)
Module 2 (4 off)
Module 3 (3 off)
Module 4 (4 off)
Pumphouse (2 off)
Drilling Modules

(b) Detection of gas at the second threshold level of 40 percent LEL in the second level ventilation ducts or access doors of drilling area "B" & "C".

(c) Failure of the 380V auxiliary power supply.

2.2.2 Except where otherwise stated, initiation of Second Level Shutdown will result in the following:

(a) A complete process shutdown.

(b) Loss of the 5.5kV power supply from TCP2.

(c) Loss of 380V supply from the auxiliary generators.

(d) Progressive load shedding. Note that on failure of the 380V auxiliary power supply, there is a delay of seven minutes before the load shedding starts.

(e) The methanol and utilities pumps stop, and the ventilation system shuts down.

(f) The fire pumps start and the deluge valves open, only on operation of the ESD pushbuttons, manual valves, or on the second threshold detection of gas in Module 4.

(g) The relevant alarm annunciators operate in the Platform Control Room and QP Control Room.

(h) Additional drilling effects of Second Level Shutdown are same as of First Level Shutdown.

2.2.3 Detection of gas in ventilation inlets and access doors, first threshold, initiate shutdown of ventilation system, and village power supply.

2.3 Third Level Shutdown

2.3.1 DP2 Third Level Shutdown is initiated by:

(a) Low instrument air pressure.
(b) Detection of gas at a level of 60 percent LEL in the Process & Drilling areas.
(c) Detection of fire in the Process Areas.
(d) Second threshold detection of fire in Module 4.
(e) Low hydraulic fluid pressure in the 3000 lb hydraulic system (Cameron).
(f) Second threshold detection of fire in Module 4, L.Q., Technical rooms & Drilling modules.

2.4 Fourth Level Shutdown

2.4.1 DP2 Fourth Level Shutdown is initiated by:

(a) Hydraulic system low pressure on 6000 PSI system or
(b) Hydraulic system low pressure on 3000 PSI system.

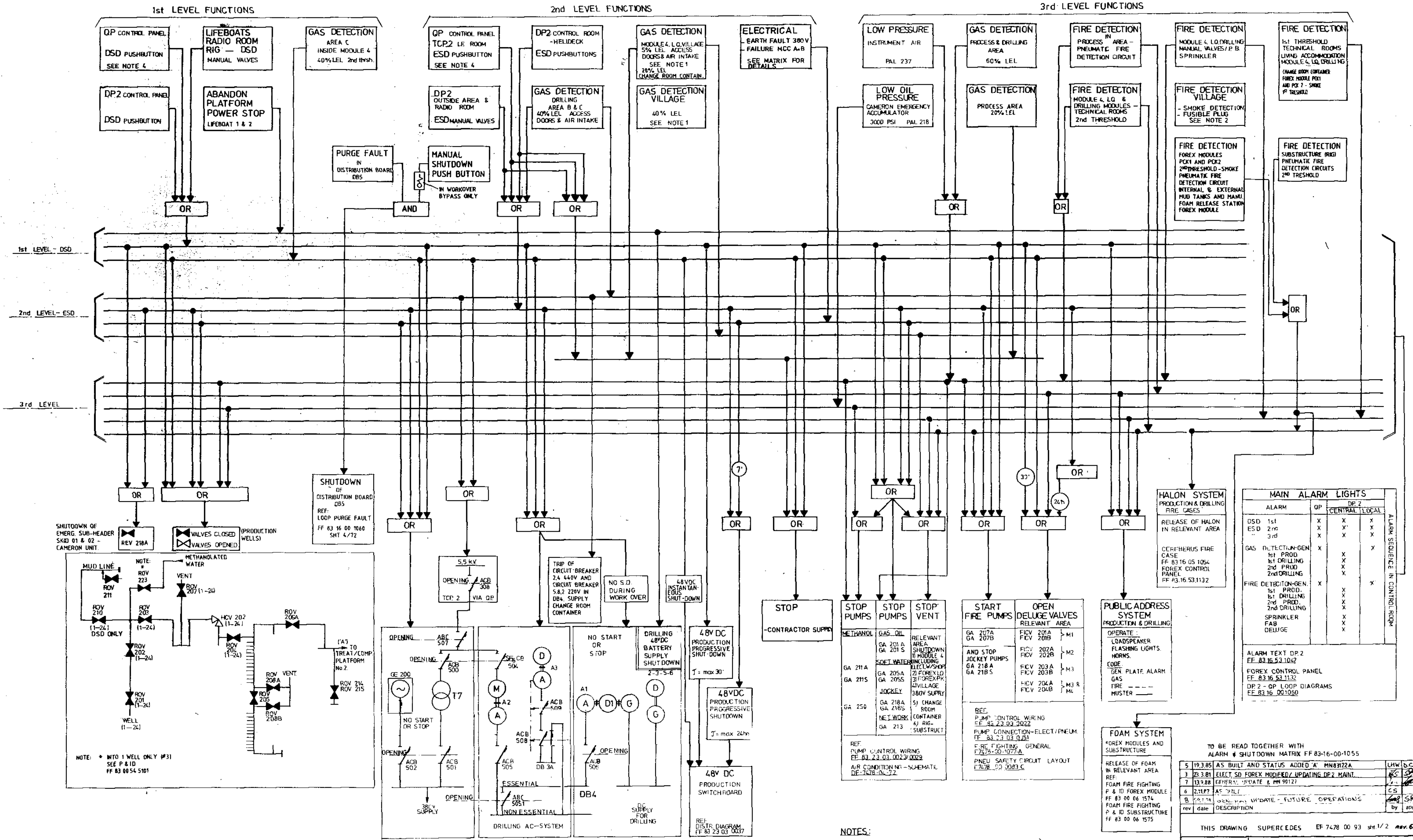
There are two pressure switches on each of the 3000 and 6000 psi systems, one controlling the west cluster of wells 1 through 12 and one for the east cluster of wells 13 through 24 (CAMERON UNIT).

2.4.2 The effects of a Fourth Level Shutdown are:

(a) Selective process shutdown - See Logic.

2.5 Fifth Level Shutdown

2.5.1 Initiation & Shutdown is related to process only.



MAIN ALARM LIGHTS

ALARM	QP	DP 2 CENTRAL	DP 2 LOCAL
DSD 1st	X	X	X
ESD 2nd	X	X	X
" 3rd	X	X	X
GAS DETECTION-GEN.	X		X
1st PROD.		X	
1st DRILLING		X	
2nd PROD.		X	
2nd DRILLING		X	
FIRE DETECTION-GEN.	X		X
1st PROD.		X	
1st DRILLING		X	
2nd PROD.		X	
2nd DRILLING		X	
SPRINKLER		X	
FAB		X	
DELUGE		X	

ABBREVIATIONS

D: DIESEL MACHINE
G: GENERATOR D.C.
A: ALTERNATOR A.C.
M: EL. MOTOR

LOAD SHEDDING DIAGRAM

FF 83 16 08 1023
FF 83 16 05 1024
FF 83 16 13 1025
FF 83 16 05 1026
EF 7478 00 1052E
FF 83 16 05 6001
FF 83 16 06 1182
1183
1184

NOTES:

1) GAS DETECTION 'VILLAGE' 2nd level (40%) initiate starting of fire pumps only.

2) FIRE DETECTION 'VILLAGE' (2nd threshold or fusible plug) initiate starting of fire pumps and 380V supply shutdown (incl. ventilation). Halon release on smoke detection.

No action exept alarm on 1st threshold detection

3) FIRE DETECTION in drilling areas & L.Q. does not shutdown wells or stop pumps.

4) OPENING ACB 308

TO BE READ TOGETHER WITH ALARM & SHUTDOWN MATRIX FF 83-16-00-1055

rev	date	DESCRIPTION	by	app
5	19.3.85	AS BUILT AND STATUS ADDED 'A' MN83122A	LHW	D.C.
3	23.3.81	ELECT. SD FOREX MODIFIED/ UPDATING DP2 MAINT.	[illegible]	[illegible]
7	13.9.88	GENERAL UPDATE & MN 90127	[illegible]	[illegible]
6	2.11.87	AS BUILT	CS	
8	[illegible]	GENERAL UPDATE - FUTURE OPERATIONS	[illegible]	SR

THIS DRAWING SUPERCEDES EF 7478 00 93 sht 1/2 Rev. 6

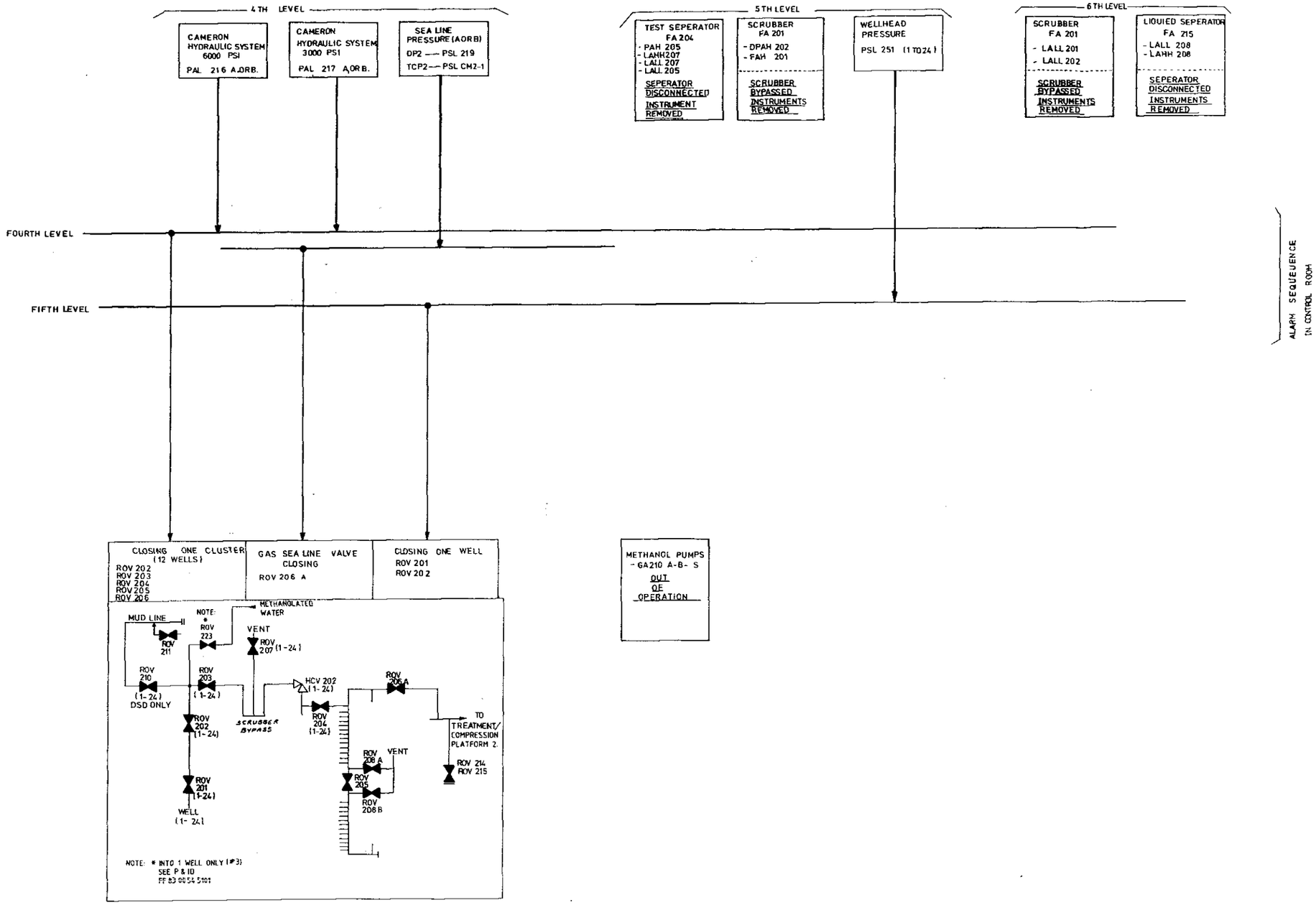
elf aquitaine norge a/s p.o box 168 - 4001 Stavanger

Status:	Installation	System
A	DP.2	SHUTDOWN

Job no
Scale

LOGIC DIAGRAM
1,2,3 LEVEL SHUTDOWN
DP 2 PRODUCTION INCLUDING INTEGRATION OF DRILLING MODULES

FRIGG FIELD — Drwg. no FF 83 16 00 1238 — Rev 8 — Sheet 1/2



TO BE READ TOGETHER WITH
ALARM SHUTDOWN MATRIX FF 83-16-0 -1055

rev	date	DESCRIPTION	by
7	7-6-91	UPDATED :- DP2 FUTURE OPERATIONS.	SR
6	239-88	UPDATED MN 90127	SR
5	19 3 85	STATUS ADDED 'A'	HW
4	152-82	REDRAWING FOLLOWING S D MATRIX FF 83-16-00-1055	T.C
0		first issue	

THIS DRAWING SUPERSEDE EF7478-00-93 SHT 2 REV. 4

elf aquitaine norge as p.o box 168 - 4001 Stavanger

status A	Installation DP2	System SHUTDOWN
		LOGIC DIAGRAM
Job no		4,5,6 TH LEVEL SHUTDOWN
Scale		
FRIGG FIELD	Dwg no FF 83 16 00 1238	Rev 7

Sheet 2/2

NOTES

- INDICATES TIME IN SECONDS
- INDICATES TIME IN MINUTES
- INDICATES TIME IN HOURS
- DENOTES GROUPING OF SIGNALS ON SINGLE WINDOW OF ANNUNCIATOR

SYMBOLS
'1' INDICATE 1 DETECTOR (LOOP) ACTIVATED
'2' INDICATE 2 DETECTOR LOOPS ACTIVATED, i.e. COINCIDENTAL
* PRODUCING WELLS ONLY

INDIVIDUALLY FOR EACH WELL

INDIVIDUALLY EACH CLUSTER

BYPASSED IN CONTROL ROOM

	DSD-ESD-ALARM	FIRE	GAS	PROCESS	UTILITY	ELECTRICAL
1	DISASTER SHU BOTTON FROM DP DSD OP					
2	MANUAL VALVES FROM RIG RADIO ROOM ESD RIG					
3	DISASTER SHUT DOWN BOTTONS FROM DP2 ESD DP2					
4	MANUAL VALVES ON SAFETY PANELS NEAR LIFEBOATS DSD (PS221)					
5						
6						
7	EMERGENCY SHUT DOWN BOTTON FROM DP ESD OP					
8	MANUAL VALVES FROM RIG RADIO ROOM ESD RIG					
9	EMERGENCY SHUT DOWN BOTTONS FROM DP2 ESD DP2					
10	MANUAL VALVES ON SAFETY PANELS ESD (PS249)					
11	EMERGENCY SHUTDOWN BUTTONS FROM HELIDECK (E & W)					
12						
13						
14						
15						
16	ABANDON RIG POWER STOP - (PF8041 No. 1 & 2					
17						
18						
19						
20		FIRE IN FOREX MOD TANK - ZNG 1 FUSIBLE PLUG & MANUAL	GAS IN VILLAGE CONTAINERS 8 % LEL	HIGH DIFF PRESS. SCRUBBERS FA 201 (TD204 OUTLET		
21		FIRE IN FOREX EXTERNAL MOD TANKS ZNG 2 FUSIBLE PLUG & MANUAL	GAS IN AREA A (MOD L & 2)	HIGH GAS FLOW SCRUBBERS FA 201 (TD204 OUTLET		
22		FIRE IN MOD 4 ENG ROOM & FUSIBLE PLUG & MANUAL	GAS IN AREA B (MOD 3 & 4)	HIGH LEVEL SANDY WATER FA 201 (TD241 LSHH 201		
23		FIRE IN VILLAGE SMOKE	GAS IN AREA C (MOD 5)	HIGH LEVEL SANDY WATER FA 201 (TD241 LSHH 202		
24		FIRE IN VILLAGE FUSIBLE PLUG	GAS IN AREA D (ACCOMODATION)	LOW LEVEL CLEAN WATER FA 201 (TD234 LSLL 202		
25		FIRE IN VILLAGE FUSIBLE PLUG	GAS IN VILLAGE CONTAINERS	HIGH LEVEL CLEAN WATER FA 201 (TD234 LSHH 202		
26		FIRE IN MODULE 2 FUSIBLE PLUG	GAS DETECTION CABINET FAULT	LOW PRESSURE IN WELL HEAD (TD 241 PSL 251 A		
27		FIRE IN MODULE 3 FUSIBLE PLUG	GAS DETECTION AREA A DRILLING	LOW PRESS. IN SEALINE A PSH 219 A		
28		FIRE IN STORAGE TANKS AND PUMP MOUSE FUSIBLE PLUG	GAS DETECTION AREA B DRILLING	LOW PRESS. IN SEALINE A PSH 219 A		
29		FIRE IN MOD 4 TECHNICAL ROOMS - SMOKE	GAS DETECTION AREA C DRILLING	LOW PRESS-SEALINE METH WATER. PSL-(CNP-3 (FROM TCP2)		
30		FIRE IN MOD 4 TECHNICAL ROOMS - SMOKE	GAS DETECTION AREA D DRILLING			
31		FIRE IN MOD 4 TECHNICAL ROOMS - SMOKE	GAS DETECTION AREA DRILLING			
32		HALON RELEASE (MOD 4 TECHNICAL ROOMS)				
33		FIRE DETECTION CABINET FAULT PROD+DRILLING				
34		HIGH PRESSURE IN DELUGE CIRCUIT PSH 268				
35		FIRE IN MOD 4 TECHNICAL ROOMS - SMOKE				
36		FIRE IN MOD 4 FAB & SPRINKLER				
37		FIRE IN LQ & HELIDECK FAB & SPRINKLER				
38		FIRE IN LQ 1ST 2nd 3th 4th FLOORS - SMOKE				
39		FIRE IN DRILLING PCK 1,2,3 & 4 - SMOKE				
40		FIRE IN LQ TECHN ROOMS - SMOKE				
41		FIRE IN DRILLING PCK 1,2,3 & 4 - SMOKE				
42		FIRE IN LQ TECHN ROOMS - SMOKE				
43		FIRE IN DRILLING PCK 1,2,3 & 4 - SMOKE				
44		HALON RELEASE DRILLING PCK				
45		HALON RELEASE LQ & TECHN. ROOMS - MANUAL				
46						
47						
48						
49		FIRE IN CHANGE ROOM CONTAINER - SMOKE	GAS IN CHANGE ROOM CONTAINER (AREA B-DRILLING)	20%LEL - 1 TRESH 40%LEL - 2 TRESH		
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75	HVAC SHUTDOWN - VILLAGE
74	HVAC SHUTDOWN - MODULE 4 (INCLUDING ELECT WORKSHOP)
73	
72	HVAC SHUTDOWN - LIVING QUARTER
71	FIRE DAMPERS CLOSE - LIVING QUARTER
70	VENT STOP - DRILLING PACKAGES
69	
68	
67	METHANOL INJECTION ROV 223 VALVE (SEALINE FROM TCP 2)
66	
65	
64	METHANOL INJECTION PARTITION VALVE ROV 215 SHUT (1)
63	METHANOL INJECTION PARTITION VALVE ROV 214 SHUT (1)
62	
61	KILL VALVES ROV 210 SHUT (*)
60	VENT VALVES ROV 208 A&B SHUT (2)
59	VENT VALVES ROV 207 SHUT (*)
58	GAS SEA LINE VALVES ROV 206 A SHUT
57	PARTITION VALVE ROV 205 SHUT
56	FLOW LINE VALVES ROV 204 SHUT (*)
55	WING VALVES ROV 203 SHUT (*)
54	MASTER VALVES ROV 202 SHUT (*)
53	DOWN HOLE VALVES ROV 201 SHUT (*)
52	
51	METHANOL PUMPS GA 211 A & S STOP
50	METHANOL PUMPS GA 250 STOP
49	CAMERON PANEL - EM SUB-HEADER - 1500PSI
48	
47	
46	
45	JOCKEY PUMPS GA 218 A&S STOP
44	NET WORK PUMP GA 213 STOP
43	SOFT WATER PUMPS GA 205 A&S STOP
42	GASOIL PUMPS GA 201 A&S STOP
41	CONTRACTOR ADDITIONAL OUTSIDE COMPRESSOR / GENERATOR STOP
40	INSTANTANEOUS 48v DC SUPPLY SHUTDOWN- PRODUCTION
39	24 V DC SUPPLY SHUT DOWN (FIRE CASE)
38	MCC 48V CHARGERS CIRCUIT BREAKER OPEN
37	PROGRESSIVE LOAD SHEDDING OF 48 DC SUPPLY
36	START GENERATOR GE 200
35	GENERATOR STOP OR START INHIBITION - GE 200
34	CIRCUIT BREAKER GE 200 (380 ES) OPEN - ACB 502
33	CIRCUIT BREAKER TRANSFORMER (380 MCC) OPEN ACB 501
32	BREAK SWITCH 5.5KV IN DP2 OPEN ACB 500
31	CIRCUIT BREAKER 5.5 KV ON TCP2 (VIA QP) OPEN ACB 308
30	CIRCUIT BREAKER 380V (MCCA 85)- SUPPLY VILLAGE OPEN
29	CIRCUIT BREAKER 220V-VILLAGE-OPEN
28	DRILLING STOP DC GENERATORS, OPEN ACB 506
27	SF6 STARTER CS04 OPEN- HV MOTOR A2
26	CIRCUIT BREAKER DB4 ACB 505 OPEN
25	FOREX GENERATOR A1 ESSENTIAL SUPPLIES START
24	MAIN 5.5kV BREAKER ACB 507 OPEN
23	BUS-TIE BREAKER DB4 ACBC 505.1 FOREX OPEN
22	EMERGENCY GENERATOR DRILLING START - A3
21	DIESEL ENGINE DRILLING STOP (DIESEL SUPPLY SHUT DOWN)
20	BREAKER OPEN- 48" BATTERY SUPPLY DRILLING
19	CIRCUIT BREAKERS 440V/220V OPEN SUPPLY CHANGE ROOM CONTAINER
18	WELDING SOCKETS PROD & VILLAGE AREA
17	SHUT DOWN OF DISTRIBUTION BOARD DB5
16	STARTING OF FIRE PUMPS GA 207 A & B
15	FOAM RELEASE RELEVANT AREA
14	OPENING OF DELUGE VALVES IN RELEVANT AREA
13	
12	HALON RELEASE RELEVANT AREA
11	HALON RELEASED LIGHTS OUTSIDE RELEVANT ROOM
10	FIRE INDICATOR LIGHTS OUTSIDE RELEVANT ROOM
9	
8	
7	GENERAL ALARM RIG PANELS-REMOTE (PASSAGEWAY & PANHOUSE)
6	
5	FIRE AND GAS WARNING INTERMITTANT SIGNAL RIG + PROD. P.A.
4	DISASTER ALARM WITH RED FLASHING LIGHTS P.A
3	ALARM ANNUNCIATOR IN DP2 CONTROL ROOM
2	ALARM DRILLER HOUSE SUBSTRUCTURE DRILL DECK
1	ALARM TO DP CONTROL ROOM

EFFECT / CAUSE

rev	date	DESCRIPTION	by	ap
12	15.9.88	UPDATED GENERAL & MN 90127	[illegible]	
11	2.11.87	AS BUILT	CS	
10	18.03.85	AS BUILT AND STATUS ADDED 'A'	LHW	A
15	29.3.91	UPDATE F. FIRE OPERATIONS	[illegible]	A
16	18.1.91	GENERAL UPDATE	BRT	A
13	6.11.89	UPDATED MN 83150 X	PAP	A
0		first issue		

THIS DRAWING SUPERSEDE EF7478-00-1075G REV 6

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Status A	DP2	EMERGENCY SHUTDOWN
	DP2 SHUT DOWN & ALARM MATRIX	

FRIGG FIELD | FF 83 16 00 10 55 | 16 | Sheet 1

FIRE AND SMOKE DETECTION

1. GENERAL

1.1 A fire and smoke detection system is provided on DP2 which will detect and give early warnings of outbreaks of fire.

1.2 Detection of fire will result in the following:

(a) An audible alarm will sound throughout the platform.

(b) DP2 firewater pumps will start.

(c) Indication of the fire area at the fire control panels in the Platform Control Room and QP Control Room.

(d) Initiation of Emergency Shutdown (ESD) if the seat of the fire is in certain areas; refer to Section 10.5 for details.

(e) In certain circumstances Halon, water deluge, foam deluge or sprinkler systems will be brought into operation; refer to Section 10.9 and 10.10 for details of areas protected by these systems.

2. DESCRIPTION

There are four types of fire detection system used on DP2, these are:

(a) Smoke detectors (ionisation type)
(b) Thermovelocimetric (heat rise) detectors
(c) Fusible plugs
(d) Optical detectors

2.1 Smoke Detectors

2.1.1 The smoke detectors used on the platform are Cerberus Type F6. Coincidence -interlocked detector heads are used in area containing electrical equipment which are fitted with the facilities for the automatic release of Halon 1301. Single detector heads are used in all other areas.

2.1.2 Each detector head transmits an electrical signal to the Cerberus Fire Detection Control Panel in the Platform Control Room. Associated alarm annunciators operate in the Control Room and, via telemetry, in the QP Control Room.

2.2 Thermovelocimetric Detectors

2.2.1 The thermovelocimetric detectors fitted on the platform are Cerberus Type D6A. This type of detector is used because it is not affected by fumes from appliances which could cause a false alarm.

2.2.2 Each detector head transmits an electrical signal to the Cerberus Fire Detection Control Panel in the Platform Control Room. Associated alarm annunciators operate in the Control Room and, via telemetry, in the QP Control Room.

2.3 Fusible Plugs/Bulbs

2.3.1 Firematic Type TP-57 fusible plugs are used in the Production Areas of Modules 1, 2 and 3. The plugs are arranged in pressure loops, which are each related to a particular area of the module. Each loop is connected to a local sprinkler control panel which controls the operation of the associated sprinkler valves. Some loops are connected to a foam release system. These are only associated with the drilling packages.

2.3.2 When a plug/bulb fuses due to heat, the following will occur:

(i) Production area.

(a) A pneumatic signal is transmitted to a pressure switch in the Fire Detection Control Panel in the Platform Control Room. The pressure switch converts the pneumatic signal to an electrical signal which operates alarm annunciators in the Control Room and, via telemetry, in the QP Control Room.

(b) The fire pumps start automatically.

(c) The pressure drop in the control loop causes the appropriate sprinkler control valves to open.

(ii) Drilling area.

See section 4.4

2.4 Optical Detectors

Optical detectors Type S6A are installed in the Electrical Workshop, Fire Pump Room A and B and Generator room. Each detector head transmits an electrical signal to the Cerberus Fire Detection Control Panel located in the Platform Control Room. Associated alarm annunciators operate in the Control Room and, via telemetry, in the QP Control Room.

GAS DETECTION

1. GENERAL

1.1 A gas detection system is provided on DP2 which will detect the presence of flammable gas within a set range before the concentrate of the gas becomes a serious hazard.

1.2 Detection of gas at the lower value of the set range will result in the following:

(a) An audible alarm will sound throughout the platform (GPA).

(b) Indication of the hazard area at the gas detection panels in the Platform Control Room, Rig panels (passageway & doghouse) and QP Control Room.

(c) For selective 1st. threshold shutdown refer to matrix.

Detection of gas at the higher value of the set range will initiate a further alarm and cause certain shutdown functions to take place. Refer to Section 10.5 for details.

2. DESCRIPTION

2.1 The gas detectors used on DP2 are Sieger Model 1402 with Type 770 explosion proof sensor heads. Each detection point has two independent sensor heads connected to the gas detection panel. The paired sensor heads each transmit an electrical signal proportional to the detected level of gas to their associated control units.

2.2 The control units are installed in the Sieger Detection Cabinet which is located in the Control Room on the second level of Module 4. Associated alarm annunciators operate in the Platform Control Room and, via telemetry, in QP Control Room. A small Sieger rack is located in the P.A. container for the village gas detectors.

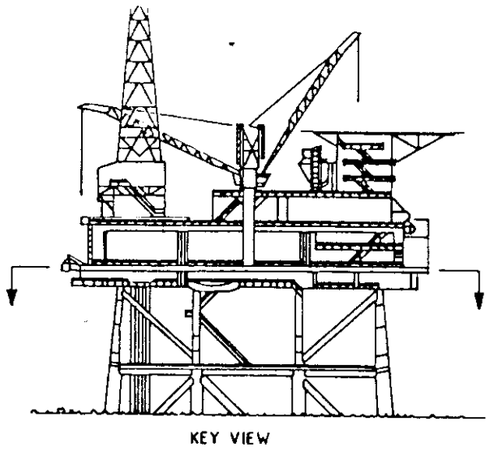
2.3 Each control unit contains two manually pre-adjusted alarm set points, for each sensor head. The alarm set-points are adjustable in the O to 100 percent range of the lower explosive limit (LEL) of gas to air mixture. An alarm is initiated when lower LEL value (first threshold) is detected by a sensor head, but automatic shutdown action is not initiated until the higher LEL value (second threshold) is detected by coincidental detection of a selected pair.

2.4 The LEL settings of the sensors are:

Module/Area	No of Detectors	LEL Setting Low	High
Village	2	8%	40%
Module 1	26	20%	60%
Module 2	30	20%	60%
Module 3	24	20%	60%
Module 4 (ventilation inlet) (ducts and access doors)	16	5%	40%
Module 4 (Technical Rooms)	10	-	40%

2.5 The normal power supply is from the 220V ac switchboard via a 220/24V transformer/Rectifier. A standby supply is provided by the main 48V battery which feeds the system through a 48/24V dc convertor. Should both main and standby supplies fail, a 24V battery is provided to power the system for three hours. Should the system be operating on the emergency power supply, then only one sensor at each detection point is in use, and activation of this sensor will result in initiation of alarm and shutdown actions as appropriate.

2.6 Each sensor is provided with a normally closed fault relay as a fail safe facility. Should the circuit to the sensor be broken then the relay will open and initiate an alarm.



KEY VIEW

MAINTENANCE AREA

LIFEBOAT 1

PLATFORM NORTH

AUXILIARY ELECTRIC GENERATOR ROOM

AIR CONDITIONING ROOM

FIRE PUMP ROOM

ELECTRICAL WORKSHOP

XFMR ROOM INLET

INSTRUMENT MAINTENANCE SHOP

XFMR ROOM

MECH. WORK SHOP

WARE HOUSE

MAINTENANCE AREA

LIFEBOAT 2.

MODULE 1

MODULE 2

MODULE 3

MODULE 4 FIRST LEVEL

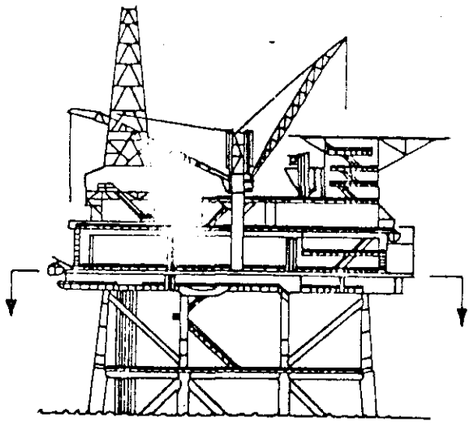
KEY

GM GAS DETECTOR

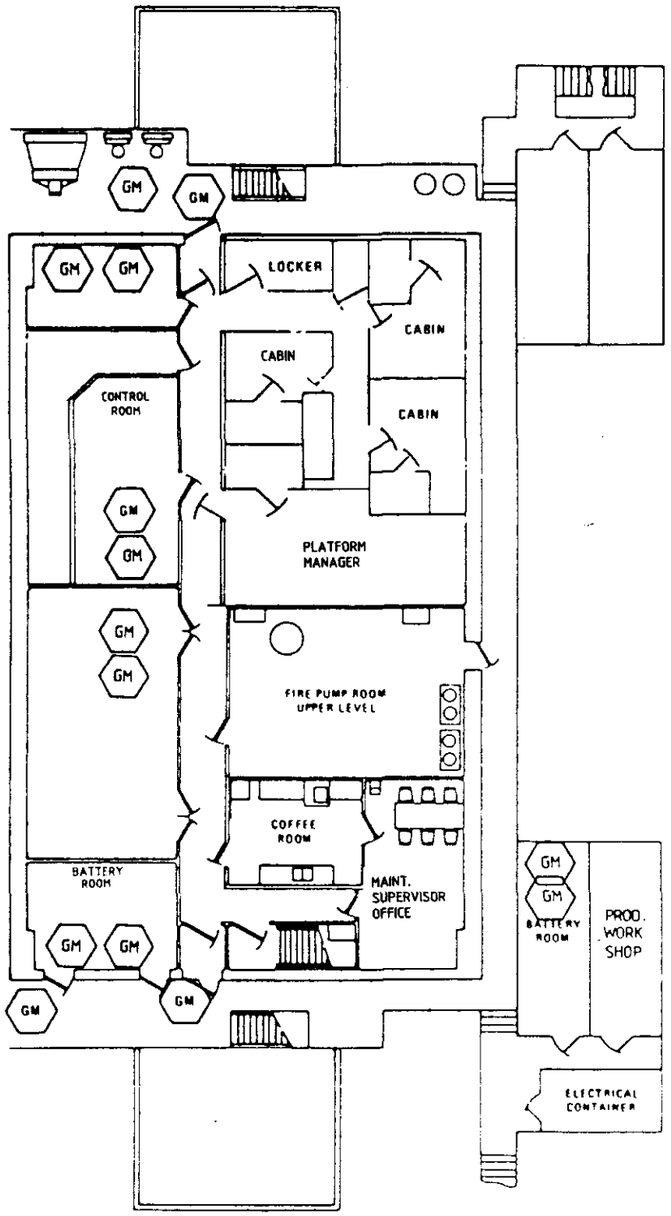
ISSUE 5, AUG. 1991

GAS DETECTION
Production Deck

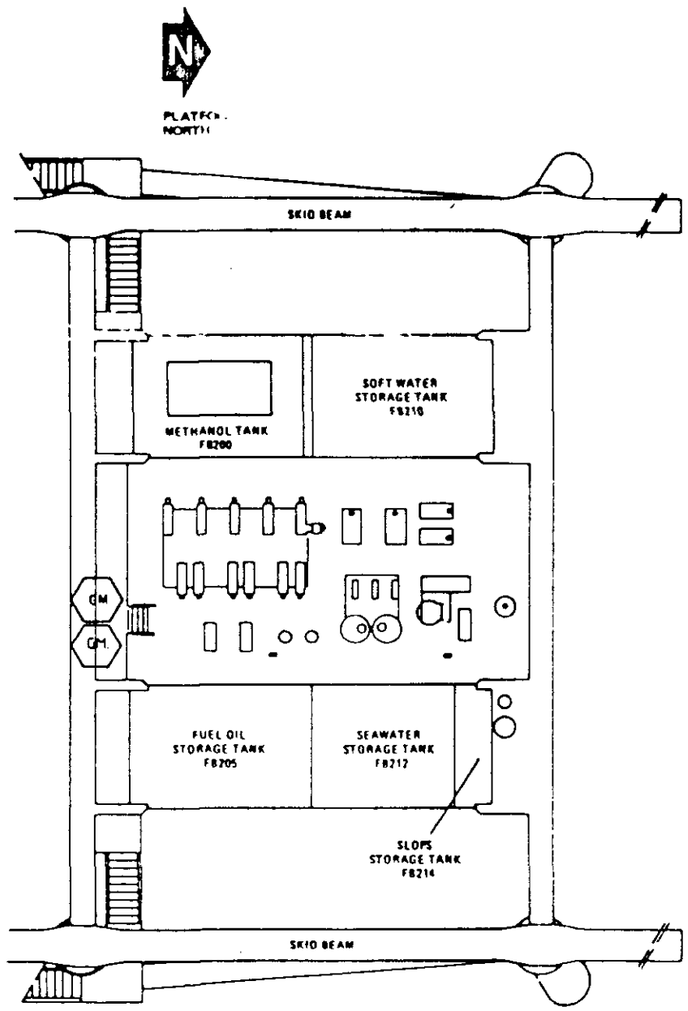
10.7.1



KEY VIEW



MODULE 4 SECOND LEVEL



PUMPHOUSE AND STORAGE TANKS

KEY

GM GAS DETECTOR

ISSUE 5, AUG. 1991

GAS DETECTION
Module 4 Second Level and Pumphouse

10.7.2

FIREFIGHTING FACILITIES

1. GENERAL

1.1 DP2 is provided with automatic and manually operated firefighting facilities in accordance with the requirements of:

(a) Mineral Workings (Offshore Installations) Act 1971.
(b) Department of Trade (Marine Division)
(c) Det Norske Veritas.

1.2 Each Platform area is provided with at least one item from the following:

(a) Automatically operated systems.
(b) Manually operated equipment.

1.3 Five different types of extinguishant are used on DP2 as follows:

(a) CO_2. Suitable for liquid fuel and electrical equipment fires, particularly when damage may be caused by water or powder, or where the voltage is too high for water. Once dispersed, it gives no protection against re-ignition. Since CO_2 excludes oxygen, there is a risk of asphyxiation if used in a confined space.

(b) **Dry Powder.** Suitable for liquid fuel and electrical equipment fires. Since dry powder has no cooling properties it gives only limited protection against re-ignition.

(c) **Water Spray.** Suitable for solid fuel fires, but may be used on live electrical equipment at up to 380V ac.

(d) **Halon 1301 (BTM).** This is a colourless, odourless, electrically non-conductive gas that extinguishes or prevents ignition by inhibiting the chemical reaction of fuel and oxygen, and is the least toxic of the vapour fire extinguishing agents. It is therefore suitable for fighting electrical fires or those involving flammable liquids. It will render a combustible mixture inert when it is present in approximately 6 percent concentration. The discharge of Halon to extinguish a fire may create a hazard to the personnel from the nature of Halon itself, and from products of decomposition that result from exposure of Halon to the fire or other hot surfaces.

(e) **Foam.** Suitable for liquid and solid fuel fires, but may be used on electrical equipment up to 380V A.C. Useful agent because of its blanket coverage which smothers the fire and prevents oxygen from reaching the ignition source. (see section 4.4).

2 DESCRIPTION

2.1 Automatically Operated Systems

The automatically operated systems use Halon 1301 as the extinguishant. Independent Halon 1301 systems are provided in platform areas which present a special fire hazard or which contain electrical equipment. The Halon is stored in pressurised cylinders and is released automatically a result of smoke detection in the protected area or manually as required.

2.2 Manually Operated Facilities

2.2.1 Manually operated facilities supplied with sea water by the firewater system are:

(a) Water hosereels.
(b) Fire cannon monitors. (Including foam - drilling pkg's)
(c) Sprinkler systems.

2.2.2 Portable equipment comprises:

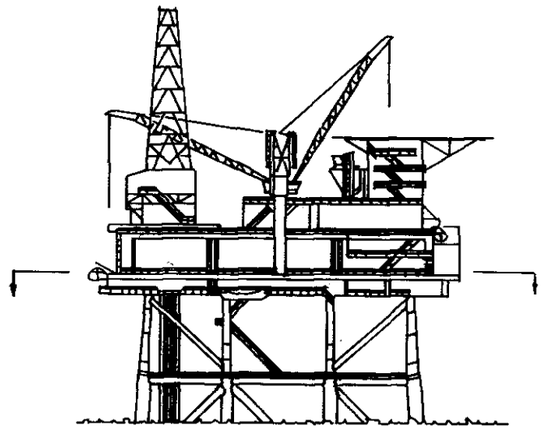
(a) Co_2 gas extinguishers - 6 kg capacity.
(b) Dry powder extinguishers - 10 kg capacity.
(c) Water spray extinguishers - 10 litre capacity.

2.3 Fireman Outfits and Rescue Equipment

2.3.1 Four sets of fireman's equipment are provided for personal protection during firefighting, and also for rescue work. These sets are located outside Module 4, two on the north side and two on the south side. Each set of equipment comprises:

(a) One hand electric safety lamp.
(b) One 20 m fireproof lifeline terminating in a snap hook for attachment to a belt.
(c) One belt.
(d) One fire axe fastened to the belt.
(e) One set of fireproof clothing.
(f) One pair of boots - electrically non-conducting up to 5000V.
(g) One pair of gloves - electrically non-conducting up to 3000V.
(h) One rigid helmet.

2.3.2 A set of open circuit breathing equipment is provided with each set of fireman's equipment. Each set comprises a Commeihnes Protection Model C60 marine type equipment complete with two loaded air bottles and a panoramic mask.



KEY VIEW

PLATFORM NORTH

MAINTENANCE AREA

LIFEBOAT 1

FOAM

AUXILIARY ELECTRIC GENERATOR ROOM

AIR CONDITIONING ROOM

FIRE PUMP ROOM

ELECTRICAL WORKSHOP

INSTRUMENT MAINTENANCE SHOP

SUB-STATION

MECH. WORK SHOP

WARE HOUSE

LIFEBOAT 2

MODULE 1

MODULE 2

MODULE 3

MODULE 4 FIRST LEVEL

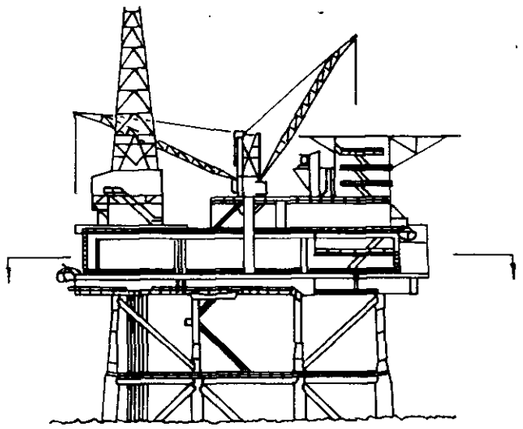
KEY

NHS	FIREPUMP START PUSHBUTTON		FIREWATER HOSEREEL
	WASHDOWN WATER HOSEREEL	C(6)	6kg CO_2 EXTINGUISHER
	HALON MANUAL RELEASE LEVER		FIRE CANNON MONITOR
DSD	DISASTER SHUTDOWN PUSHBUTTON	D(10)	10kg DRY POWDER EXTINGUISHER
ESD	EMERGENCY SHUTDOWN PUSHBUTTON	W(10)	10lb WATER SPRAY EXTINGUISHER
	MANUAL DELUGE START		

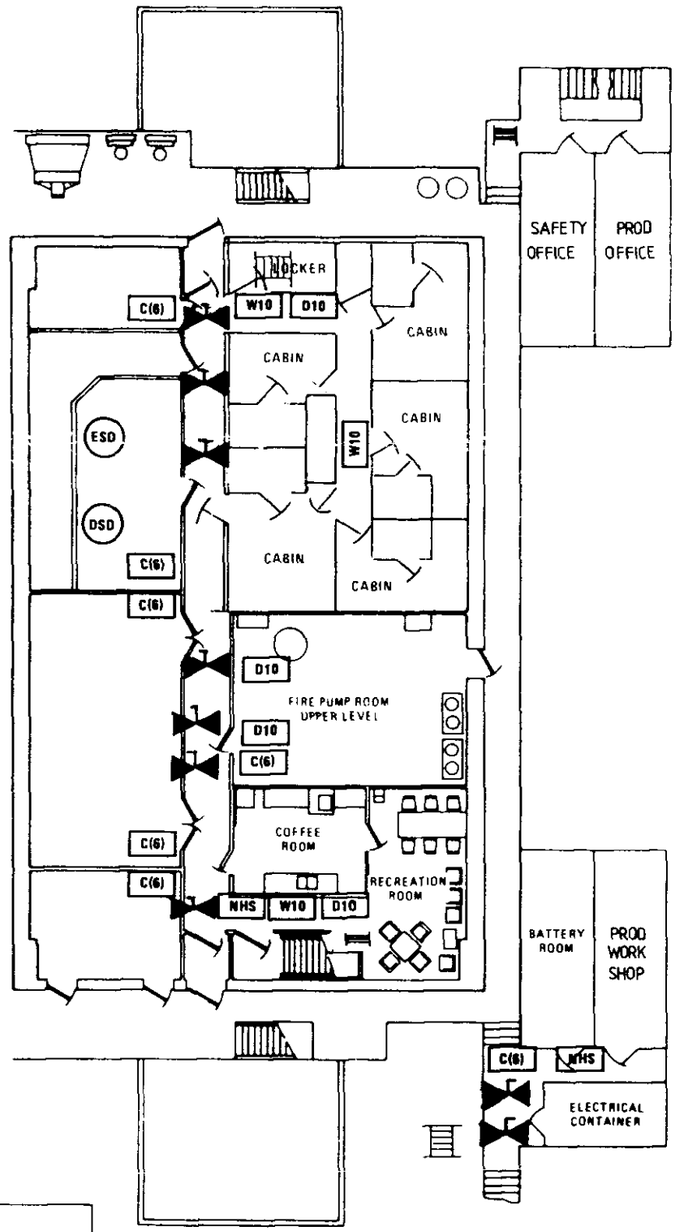
ISSUE 4, AUG. 1991

FIREFIGHTING FACILITIES
Production Deck

10.8.1



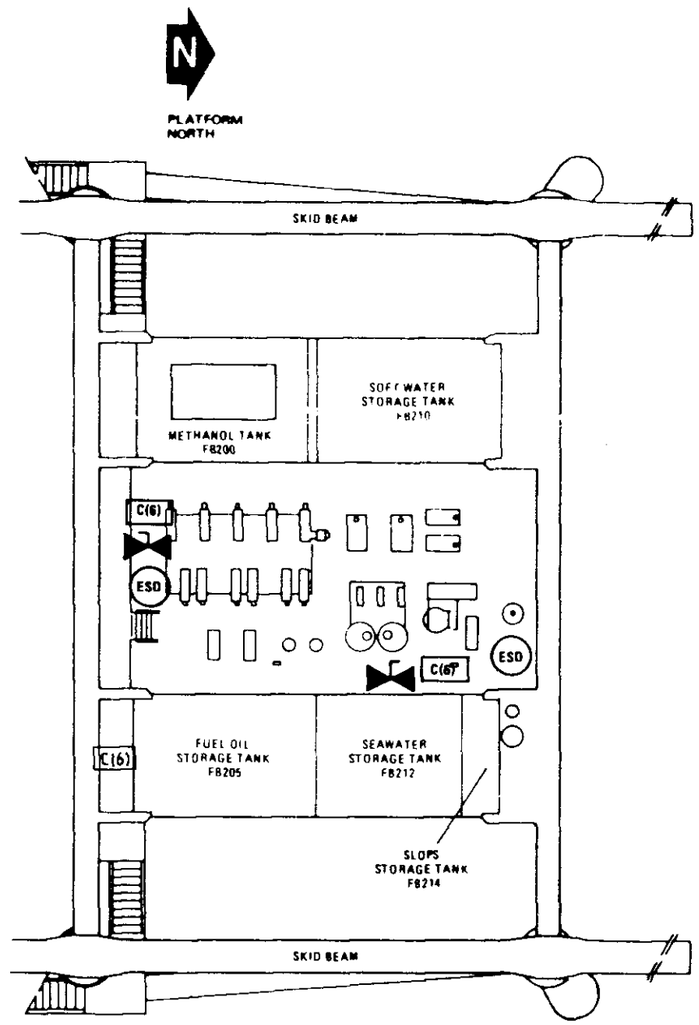
KEY VIEW



MODULE 4 SECOND LEVEL

KEY

- FIREWATER HOSEREEL
- HALON MANUAL RELEASE LEVER
- NHS FIREPUMP START PUSHBUTTON
- ESD EMERGENCY SHUTDOWN PUSHBUTTON
- DSD DISASTER SHUTDOWN PUSHBUTTON
- D(10) 10kg DRY POWDER EXTINGUISHER
- W(10) 10lb WATER SPRAY EXTINGUISHER
- C(6) 6Kg CO EXTINGUISHER
- MANUAL DELUGE START



PUMPHOUSE AND STORAGE TANKS

ISSUE 3 OCTOBER 1984

FIREFIGHTING FACILITIES
Module 4 Second Level and Pumphouse

10.8.2

FIREWATER SYSTEM

1. GENERAL

1.1 The Firewater System is a ring main system supplied with sea water by two diesel driven centrifugal firewater pumps. Valved off-takes are provided to hosereels, sprinkler systems and fire cannon monitors.

1.2 The starting of the firewater pumps can be initiated automatically or manually. In the automatic mode the pumps are started simultaneously, in the manual mode they are started individually.

1.3 The firewater ring main system is interconnected with the sea water system and the drill right firewater system.

1.4 The firewater ring main system is pressurised with chlorinated sea water from jockey pumps which are started and stopped automatically. A flow of water is maintained through the ring main system in order to prevent freezing.

2. DESCRIPTION

2.1 Firewater Pumps

2.1.1 The firewater pump diesel engines are located in the Pump Room in Module 4, one being separated from the other by a Solas A60 rated fireproof wall to provide protection in the event of a fire in the room. The submerged five stage pumps are installed in 24in stilling tubes immediately below the engines, with their suctions at elevation -17.75m. Provision is made for chlorine injection into the pumps' suctions to suppress marine growth in the firewater lines.

2.1.2 The pumps are each rated to deliver $400m^3/h$ at a discharge pressure of 13 bar against a head of 127.5m, and the engines are each rated at 353.9kW at a speed of 1800 rev/min. Both pumps discharge into the firewater ring main via 8in lines, each incorporating a pressure indicator, Y-type strainer, check valve and isolating valve. A 6in line and isolating valve connecting the discharge line to the 30in sewer header is used to dispose of the water when testing the pump.

2.1.3 Each pump is provided with both an electric starter motor powered by 24V batteries, and a pneumatic starter motor supplied with compressed air at 12 bar from storage bottles via a pressure reducing valve. The bottles are pressurised to 40 bar by start up compressors, one electrically driven and one diesel driven for each firewater pump.

2.1.4 During an auto start the engine is initially electrically cranked, automatically switching to pneumatic cranking after six start attempts. Provision is also made to manually initiate the auto start cycle, or to start the engine under manual control either electrically or pneumatically by overriding the auto start cycle. Once started, a pump can only be stopped from the local control console.

2.1.5 Gas oil for each pump is stored in locally mounted gas oil day tank FB216 A or B, each of which has a capacity of $1m^3$. These tanks are automatically replenished from gas oil storage tank FB205, a level switch in each tank starting and stopping the gas oil pump, and opening and closing a level control valve, as appropriate. Should one tank fill before the other the overflow is led back to the storage tank via an equalising line.

2.2 Firewater Ring Main

2.2.1 The ring main is located in the Support Frame below Modules 2 and 3. Tappings from the main supply the hosereels, fire cannon monitors and sprinkler systems located on the Production Deck of the platform.

2.2.2 When the system is not in operation the ring main is pressurised to between 2 and 4 bar with chlorinated sea water from jockey pump GA218 A or S. A continuous flow through the system is provided by 2in line NW2040, which is tapped from each half of the ring main via a sight glass, and discharges to sea via sea water storage tank FB212 overflow line. A pressure switch starts and stops the jockey pump to maintain the pressure within preset limits, a pressure control valve in the discharge line limiting the flow thought the ring main.

2.2.3 The ring main is divided into halves by valves, alternate sprinkler lines in each module being supplied from each half. This will ensure continuous fire protection in the event of one half of the main being out of service for any reason.

2.3 Sprinkler Systems

2.3.1 Independent sprinkler systems are installed to cover the production areas of the platform. Details of the areas covered, the controlling valves and the number of sprinklers are given in the following table:

Area	Deluge Valve	Sprinklers	
		Circular	Screen
Module 1	FICV201 A & B	128	12
Module 2	FICV202 A & B	95	6
Module 3	FICV203 A & B	132	-
Storage and Pumphouse	FICV204 A	14	-
Module 3/4 Screen	FICV204 B	-	40

2.3.2 The systems have been designed to provide a coverage of 20 litres/min/m^2 over the production areas. Each system can be activated by one of the following means;

(a) Automatically by the rupturing of one more more of the fusible plug fire detectors in the area. This will vent the 3 bar air pressure in the fire detection circuit which will start the firewater pumps via a pressure switch, and open the deluge valves in the area via the pressure switch and the electro-valve.

(b) Manually by opening the fire alarm vent valve on the safety panel in the area.

(c) 40 percent gas detection inside Module 4 initiates an instantaneous deluge by load shedding of 48V circuit.

2.3.3 All systems can be operated simultaneously by:

(a) Opening any of the ESD vent valves on the safety panels (24 hours time delay).

(b) Operating any one of the ESD pushbuttons in the Platform Control Room, Rig Radio Room, Helideck and QP Control Room (24 hours time delay).

(c) Operating any one of the DSD pushbuttons in the Platform Control Room, Rig Radio Room, QP Control Room or by Lifeboat Stations 1 and 2.

2.4 Hosereels

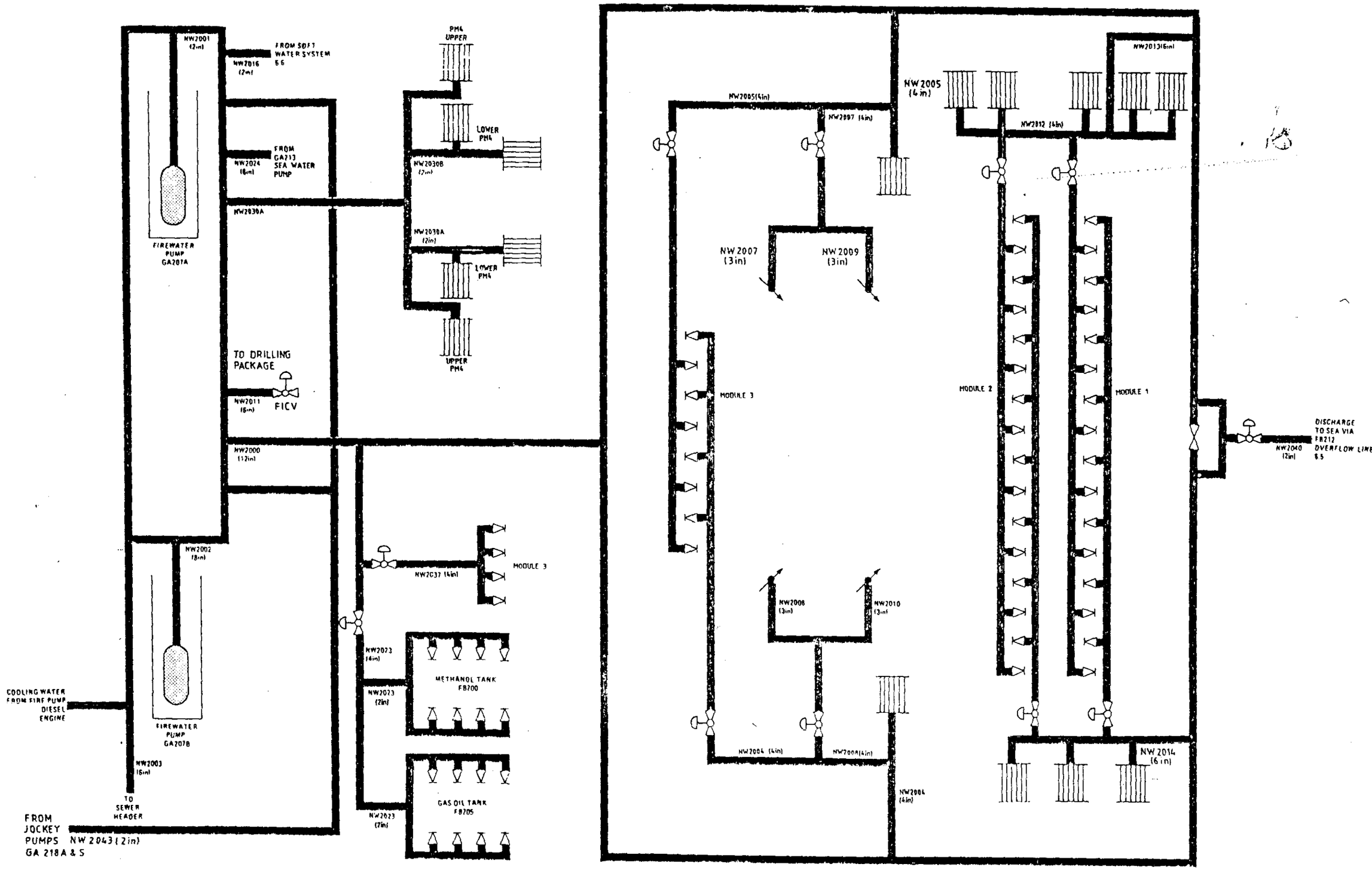
2.4.1 Eleven hosereels are provided for manual firefighting. Four are located in Module 1, four in Module 2, two in Mod. 3 and two on each level of Module 4.

2.4.2 Each hosereel is provided with 20m of 65mm inside diameter hose and has a capacity of $30m^3/h$. They are fed from the firewater ring main via isolating valves.

2.4.3 Pushbuttons have been provided near each hosereel to start either network pump GA213 (and thus feed the hosereel via the ring main tie-in connection), or firewater pumps GA207 A and B. Operation of a network pump start pushbutton will also open PCV247 in the discharge line from the pump to the washdown network; see section 6.5.

2.5 Fire Cannon Monitors

Four monitors have been provided for manual firefighting, one at each end of Module 3 and one on each work area at either end of Module 4. They are each rated to deliver $30m^3/h$.



FOR MORE DETAILED INFORMATION
SEE FF83.00.06.5015.

HALON SYSTEMS

1. GENERAL

Halon 1301 (BTM) is a colourless, odourless, electrically non-conductive gas that extinguishes or prevents ignition by inhibiting the chemical reaction of fuel and oxygen, and is the least toxic of the vapour extinguishing agents. It will render a combustible mixture inert when it is present in approximately 6 percent concentration. Halon 1301 is normally very safe. However, when Halon is released into the atmosphere within a compartment, that compartment should be vacated as soon as possible. Under extreme conditions the Halon can break down to form acidic compound.

2. DESCRIPTION

2.1 Halon systems are located in selected platform areas to provide an automatic firefighting system. The appropriate Halon system may be automatically operated as a result of detection via coincidence interlocked circuits or manually from units located to the main entrance to each protected area.

2.2 Halon is distributed within each protected area by a pipework system, fitted with discharge nozzles specially designed to suit the particular application and strategically located to flood the entire area.

2.3 To provide personnel with sufficient time to evacuate an affected area prior to the discharge of the Halon extinguishing system, a preset time delay is incorporated in the release mechanism. During the time delay period an audible alarm will sound. The delay period is set when the time required for evacuation purposes has been determined, but will not exceed 30 seconds.

2.4 Visual indication is provided at the entrance to each Halon protected area, showing the state of the system as follows:-

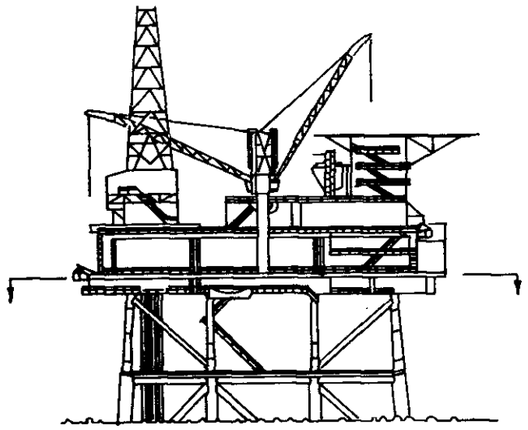
(a) Red lamp illuminated indicating Halon release
(b) Amber lamp illuminated indicating system in auto.
(c) Green lamp illuminated indicating system in manual.

2.5 It is desirable to isolate the automatic operation of a Halon extinguishing system before personnel work within the protected area. To achieve this, a key operated switch is provided at the main entrance to the area.

3. LOCATION OF HALON SYSTEMS

Completely independent Halon systems are provided for each area listed below, ie each area has its own Halon bottles and fire detectors, which only activate the system within that particular area.

Area	Containers	Weight (kg)
Substation	2	22 each
Electrical Workshop	1	65 each
Auxiliary Generator Room	3	43.5 each
Instrument Room	2	29 each
Fire Pump Rooms A & B	4	29 each
Air Conditioning Room	1	65 each
Telemetry Room	1	14.5 each
Control Room	1	65 each
MCC Room	1	65 each
Battery Room	2	22 each
Fire Pump Room (upper level)	1	65 each
Methanol Storage Tank	-	-
Village Electrical Container	1	5 each
Village Battery Container	1	7.5 each
Liebherr Crane	-	-



KEY VIEW

PLATFORM NORTH

MAINTENANCE AREA

LIFEBOAT 1

AUXILIARY GENERATOR ROOM

AIR CONDITIONING ROOM

FIRE PUMP RM

ELECTRICAL WORKSHOP

FIRE PUMP ROOM

INSTRUMENT AND MAINTENANCE SHOP

SUB STATION

MECH. WORK SHOP

WARE HOUSE

MAINTENANCE AREA

LIFEBOAT 2

MODULE 1

MODULE 2

MODULE 3

MODULE 4 FIRST LEVEL

KEY

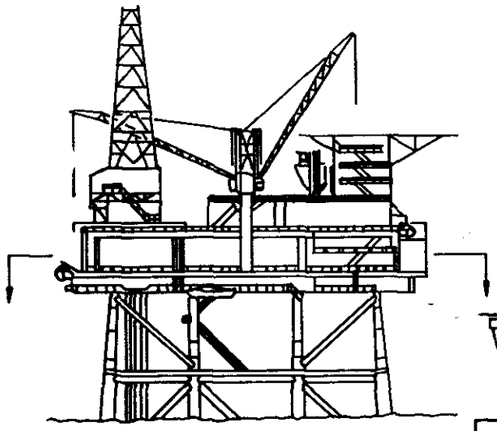
HALON MANUAL RELEASE LEVER

AREA PROTECTED BY HALON

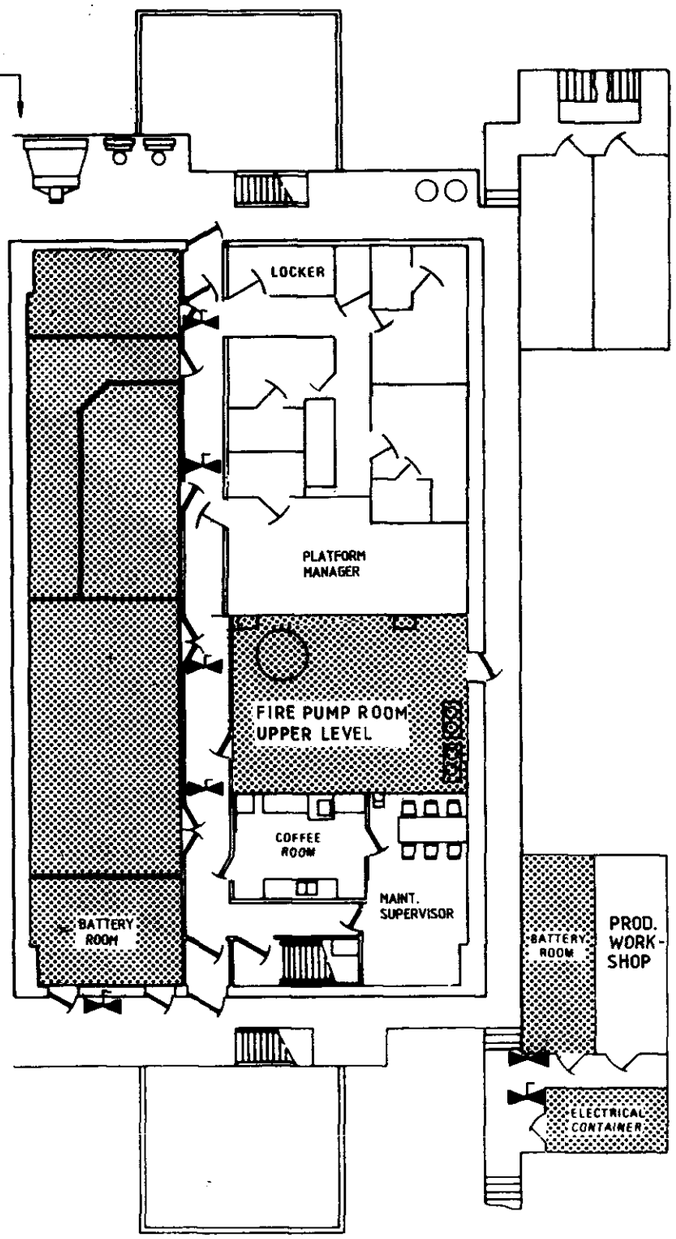
ISSUE 4, AUG. 1991

HALON SYSTEM
Production Deck

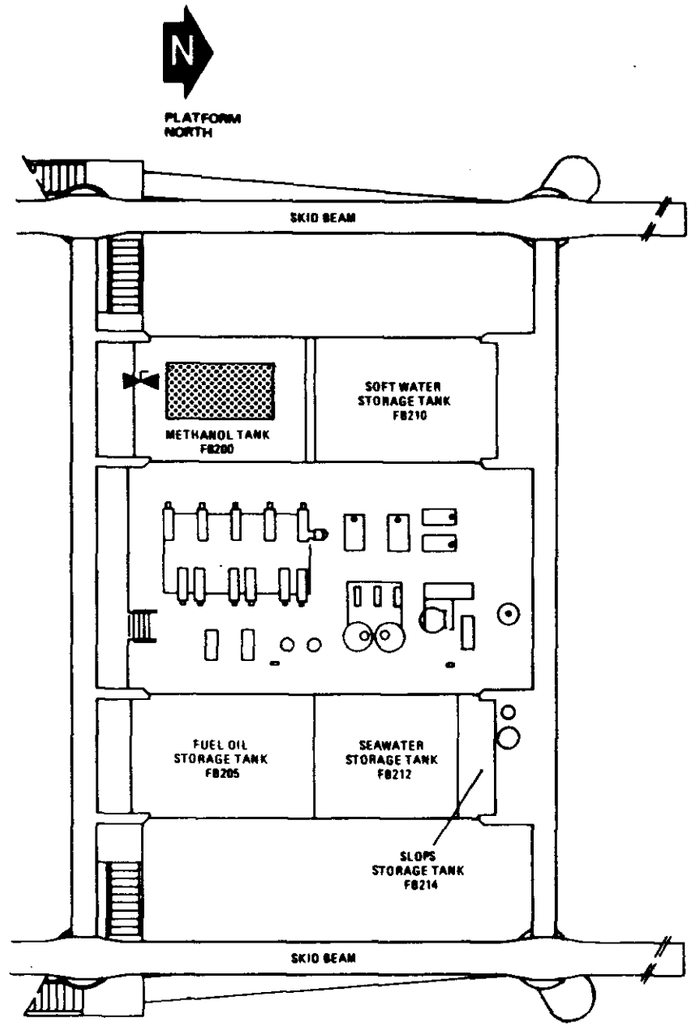
10.10.1



KEY VIEW



MODULE 4 SECOND LEVEL



PUMPHOUSE AND STORAGE TANKS

KEY

AREA PROTECTED BY HALON

HALON MANUAL RELEASE LEVER

ISSUE 5, AUG. 1991

HALON SYSTEM

Module 4 Second Level and Pumphouse

10.10.2

FIREWALLS AND FIREPROOFING

1. GENERAL

1.1 Firewalls are provided at various locations on the platform to give maximum protection to personnel by limiting the spread of fire.

1.2 Equipment vital to the safety of personnel in an emergency is protected by additional firewalls. The location and construction of these walls is given in the following tables:

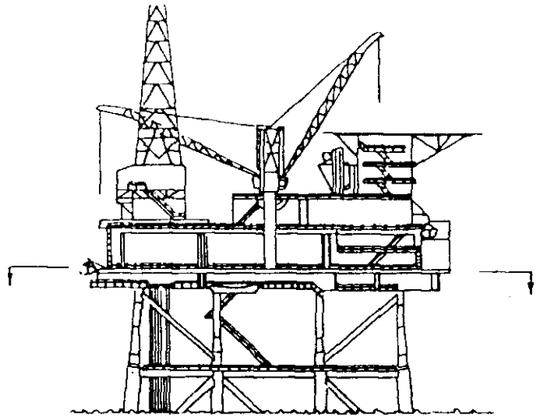
MAIN FIREWALLS

Module No.	Location of Wall	Materials of Construction	SOLAS Rating
1	South, east and west exterior	2mm stainless steel cladding	BO
2	East and west exterior	2mm stainless steel cladding	BO
3	North exterior	2mm stainless steel cladding	BO
4	South of module between rows A and B	6mm thick steel, 460mm air gap, two 40mm thick layers of rockwool	A60
	Extension of above	6mm thick steel	AO
	North, east and west exterior walls	2mm thick stainless steel cladding, two 40mm thick layers of rockwool, 380mm air gap and 50mm thick isolamin	33B

PARTITION FIREWALL

Materials of Construction	SOLAS Rating
Composite panels comprising a core of profiled 4mm thick steel sheet with a 25mm thick isolamin 45A panel fixed on each side. The core space is 50mm wide.	A60
Composite panels as for A60 above but without the profiled steel sheet. The core space is 30mm wide	B15
Note Isolamin 45A Panels comprise compacted rockwool ($160kg/m^3$) sandwiched between two 0.8mm thick steel sheets. The visible side is protected by a PCV film, the other side being galvanised.	

1.3 A gas tight wall is provided between Modules 1 and 2 and another divides Module 1. The gas tight walls are made of 8mm steel.



KEY VIEW

MAINTENANCE AREA

LIFEBOAT 1

PLATFORM NORTH

AUXILIARY ELECTRIC GENERATOR ROOM

AIR CONDITIONING ROOM

FIRE PUMP ROOM

FIRE PUMP ROOM

ELECTRICAL WORKSHOP

INSTRUMENT AND MAINTENANCE SHOP

SUBSTATION

MECH. WORK SHOP

WARE HOUSE

MAINTENANCE AREA

LIFEBOAT 2

MODULE 1

MODULE 2

MODULE 3

MODULE 4 FIRST LEVEL

KEY

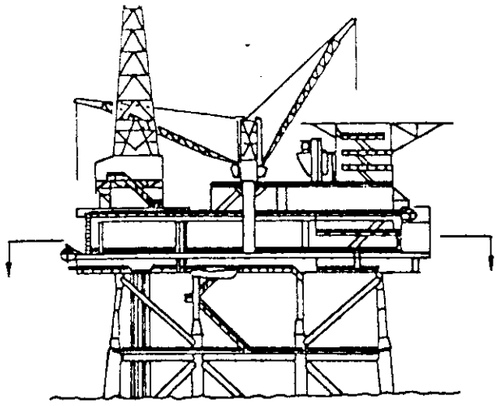
- SELF CLOSING DOOR
- SOLAS A60 FIREWALL
- SOLAS B15 FIREWALL
- SOLAS A0 FIREWALL
- SOLAS B0 FIREWALL

ISSUE 3, AUG. 1991

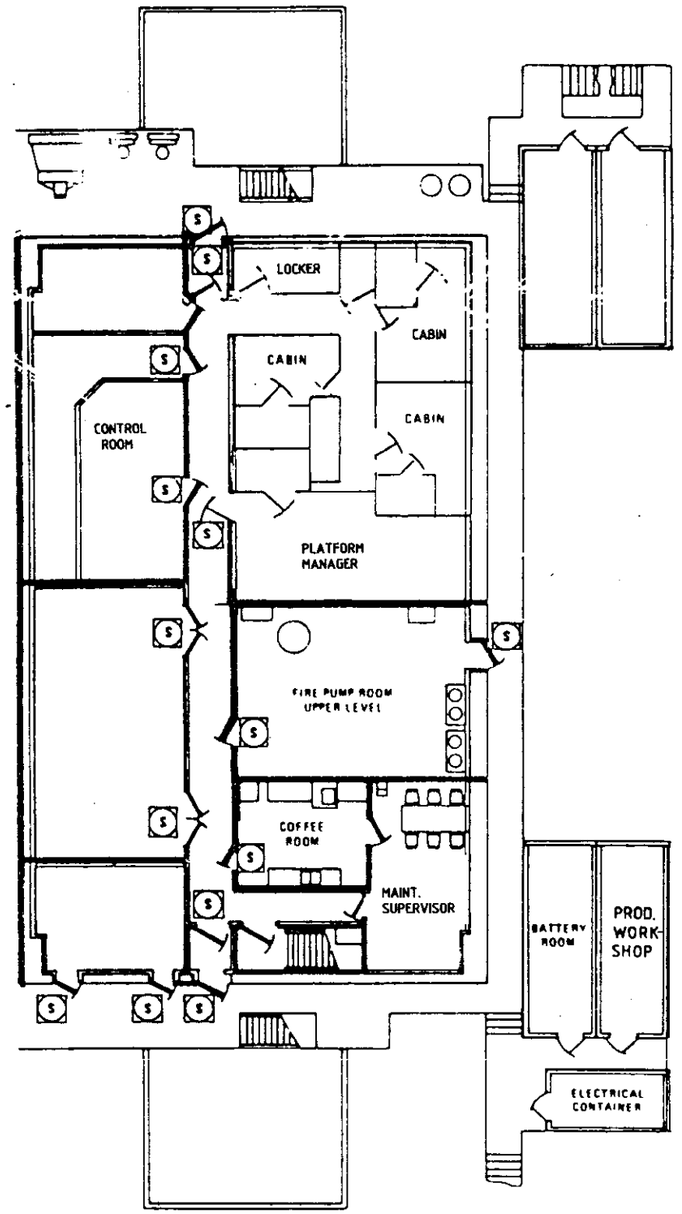
FIREWALLS AND FIREPROOFING

Production Deck

10.11.1

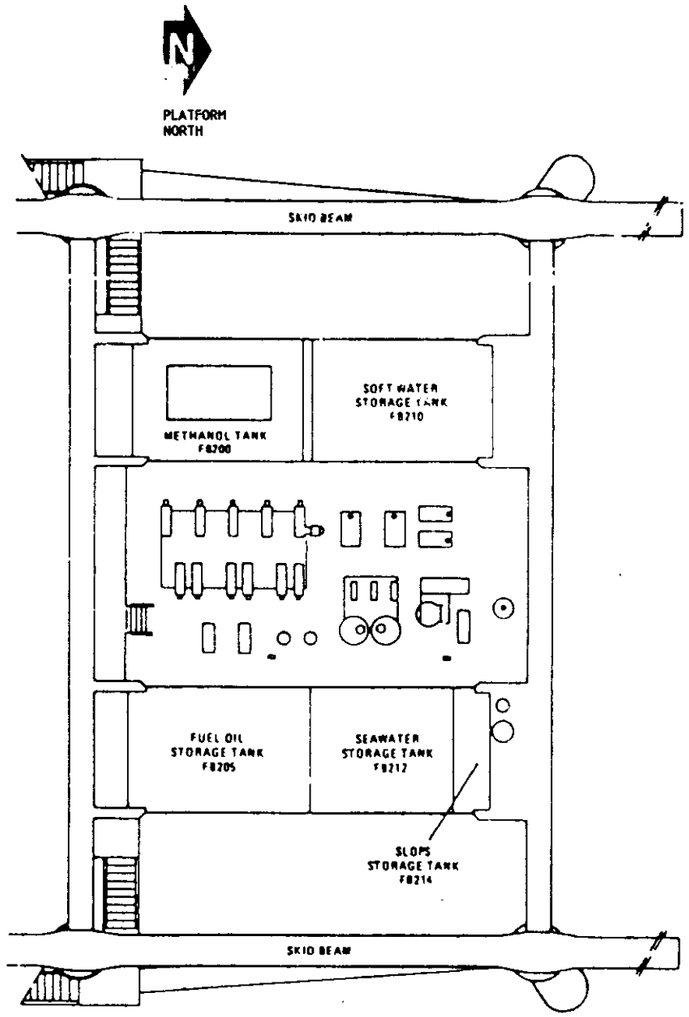


KEY VIEW



MODULE 4 SECOND LEVEL

KEY	
	SOLAS A60 FIREWALL
	SOLAS B15 FIREWALL
S	SELFCLOSING DOOR



PUMPHOUSE AND STORAGE TANKS

ISSUE 4, AUG. 1991

FIREWALLS AND FIREPROOFING
Module 4 Second Level and Pumphouse

10.11.2

FIRST AID

1. GENERAL

1.1 Platform QP is equipped with medical facilities to cater for the total complement of 128 men working on platforms QP, TP1 and TCP2.

1.2 Infirmary is located on the middle deck of Platform QP.

1.3 First aid kits and strechers are distributed around the platform and a trained nurse will be available to administer first aid.

1.4 Platform DP2 has its own medical facilities.

2. RESPIRATORY RESUSCIATION (ARTIFICIAL RESPIRATION)

2.1 General

2.1.1 There are several widely publicised methods of artificial respiration, the most effective of which is Mouth-to-Mouth (Mouth-to-Nose).

2.2 Mouth-to-Mouth (Mouth-to-Nose)

(1) Lay the patient on his back with support under the back of neck (fig. 1).

(2) Clear the patient's mouth of any obstruction, eg water, oil, debris, vomit, false teeth etc (fig. 2).

(3) Press the top of the patient's head to tilt it backwards. This ensures that the patient's airway is open (fig. 1).

(4) Press the patient's chin upwards to ensure that the tongue is clear of the airway (fig. 3).

(5) Open your mouth and take a deep breath, pinch the patient's nostrils closed (fig. 4).

(6) Place your mouth over the patient's, making sure that you have a good seal, and blow into the patient's mouth causing the chest to rise (fig. 5).

(7) Remove your mouth and watch the patient's chest fall.

(8) Repeat this cycle at a rate of 12 breaths per minute until normal breathing resumes, or until all hope is abandoned.

(9) When normal breathing resumes, place the patient into the Coma position (fig. 6). This ensures that any vomiting, saliva etc does not interfere with the patient's natural breathing.

(10) Keep a close watch on the patient's breathing at this stage, and obtain medical help as soon as possible.

(11) If for any reason the patient's mouth cannot be sealed, the hand supporting the chin may be used to close the mouth the Mouth-to-Nose method used (fig. 7).

Figure 1

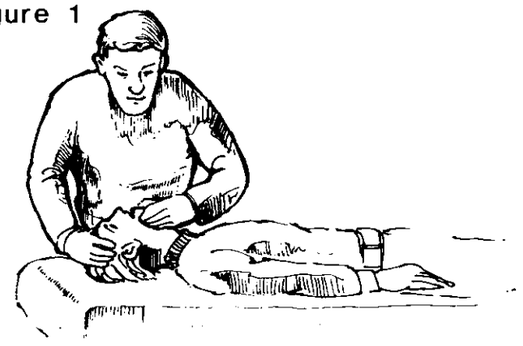


Figure 2

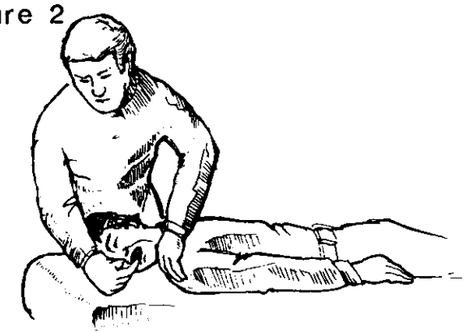


Figure 3

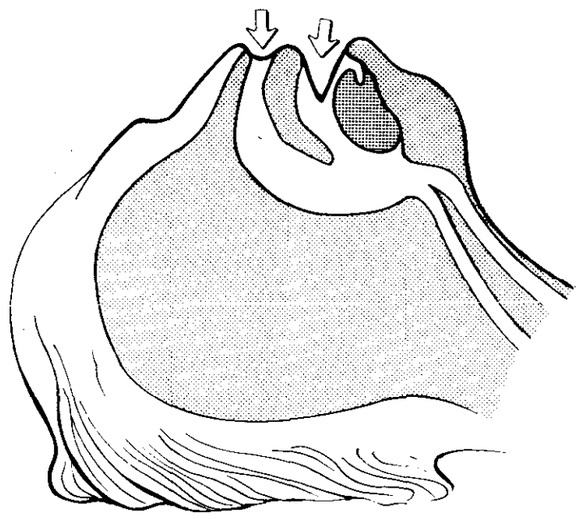


Figure 4

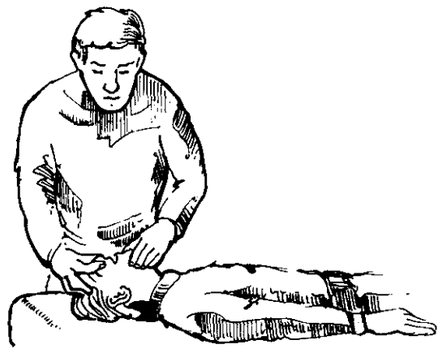


Figure 5

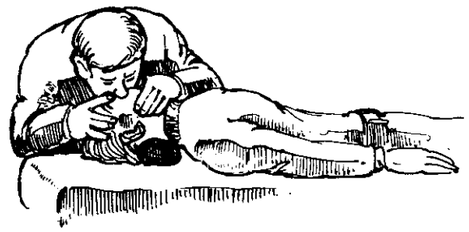


Figure 6

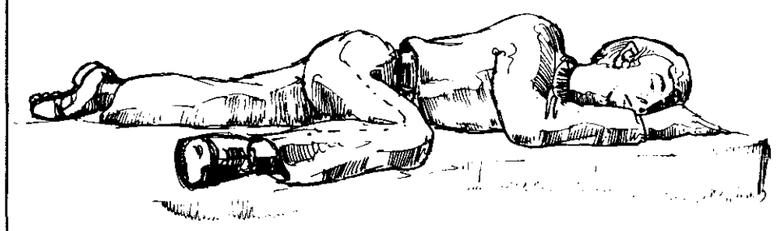
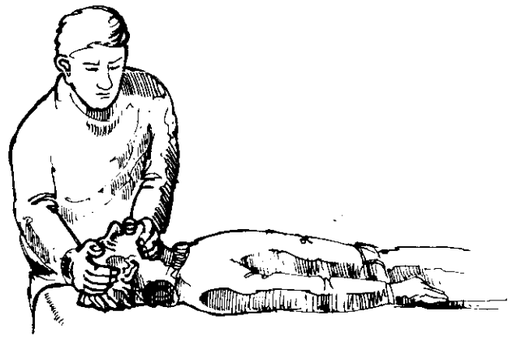


Figure 7



Mouth-to-Mouth
(Mouth-to-Nose)

Figure 8

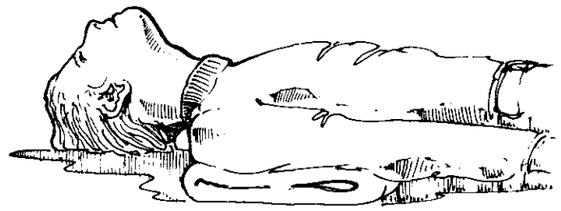


Figure 9

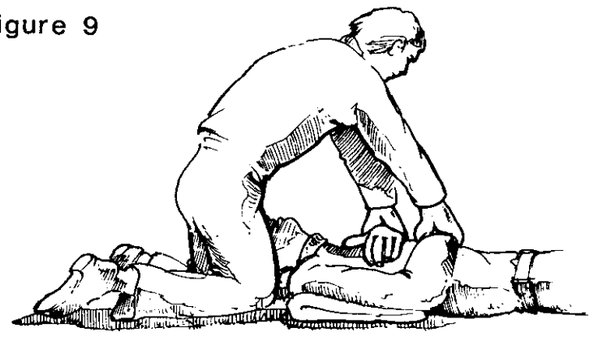


Figure 10

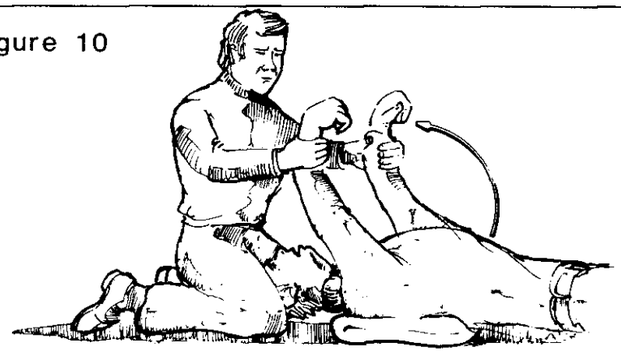
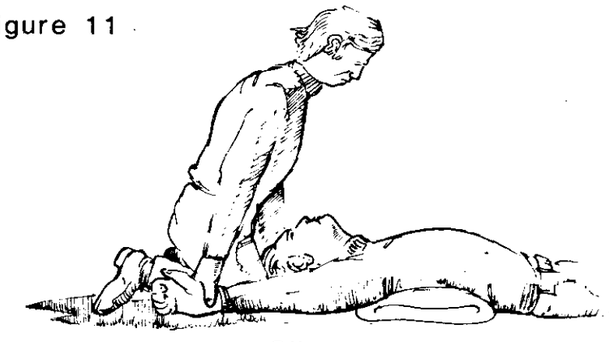


Figure 11



Silvester

ISSUE 1. OCTOBER 1980

ESCAPES ROUTES

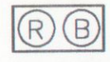
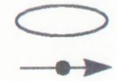
1. GENERAL

1.1 Personnel are allocated a Lifeboat Station on arrival at the platform, and should familiarise themselves with its position and the escape routes thereto.

1.2 Escape routes are clearly marked routes leading from platform areas to the Lifeboat Stations.

1.3 All regularly manned areas are provided with two well defined escape routes, indicated by prominently displayed signs.

1.4 In the event of a main power failure, adequate lighting of the escape routes and Exit signs is provided by the emergency lighting system.

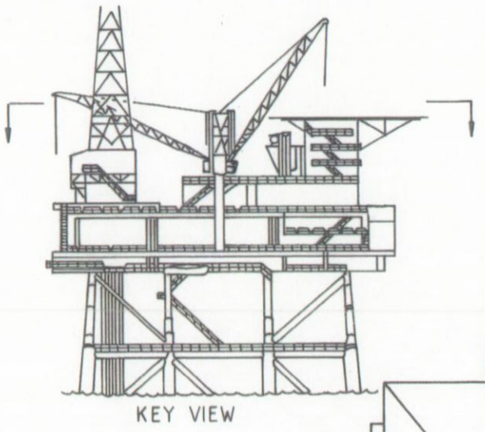
SYMBOL	SYMBOL DESCRIPTION	SYMBOL FORKLARING
	PORTABLE FIRE-EXTINGUISHER DRY CHEMICAL, WATER, CO_2 .	FLYTTBART BRANNSLUKKINGSAPPARAT PULVER, VANN, CO_2
	STATIONARY FI-FI EQUIPMENT FOAM UNIT, HOSE REELS, WASHDOWNS REELS	FAST MONTERT BRANNSLUKKINGSUTSTYR SKUM ENHET, BRANNSLANGE, SPYLESLANGE
	ALARM PUSHBUTTON FIRE PUMP START, GENERAL ALARM, MUSTER ALARM, DISASTER SHUTDOWN, EMERGENCY SHUTDOWN	ALARM KNAPP BRANNPUMPESTART, GENERELL, MØNSTRINGS ALARM MANUELL UTLØSNING D.S.D. E.S.D.
	FIRE, TECHNICAL TEAM LOCHER BREATHING APPARATUS, FIREMEN OUTFIT	BRANN, TEKNISK LAG SKAP PUSTEAPPARAT, BRANNMANNS UTSTYR
	CRASH KIT	HAVARI UTSTYR
	LIFERAFT	REDNINGSFLÅTE
	LIFEJACKETS	REDNINGSVESTER
	SURVIVAL SUIT	OVERLEVNINGS DRAKT
	LIFE BUOYS	LIVBØYER
	EYE RINSE	ØYE SKYLL
	FIRST AID	FØRSTE HJELP
	AREA PROTECTED BY HALON OR CO_2	OMRÅDE BESKYTTET AV HALON ELLER CO_2
	AREA PROTECTED BY DELUGE	OMRÅDE BESKYTTET AV OVERRISLING
	ESCAPE ROUTES	RØMNINGSVEIER
	RED & BLUE FLASHING LIGHT	RØDT & BLÅTT BLINKENDE LYS
	MANUEL ACTUATION OF AUTOMATIC HALON OR CO_2	MANUELL UTLØSNING AV DET AUTOMATISKE HALON/CO_2 ANLEGGET
	MANUEL DELUGE START COCK	MANUELL START AV OVERRISLINGSANLEGGET
	LIFEBOATSTATION	LIVBÅTSTASJON
	FIRE WATER MONITOR	VANNKANON
	KNOTTED ROPE	TAU MED KNUTER

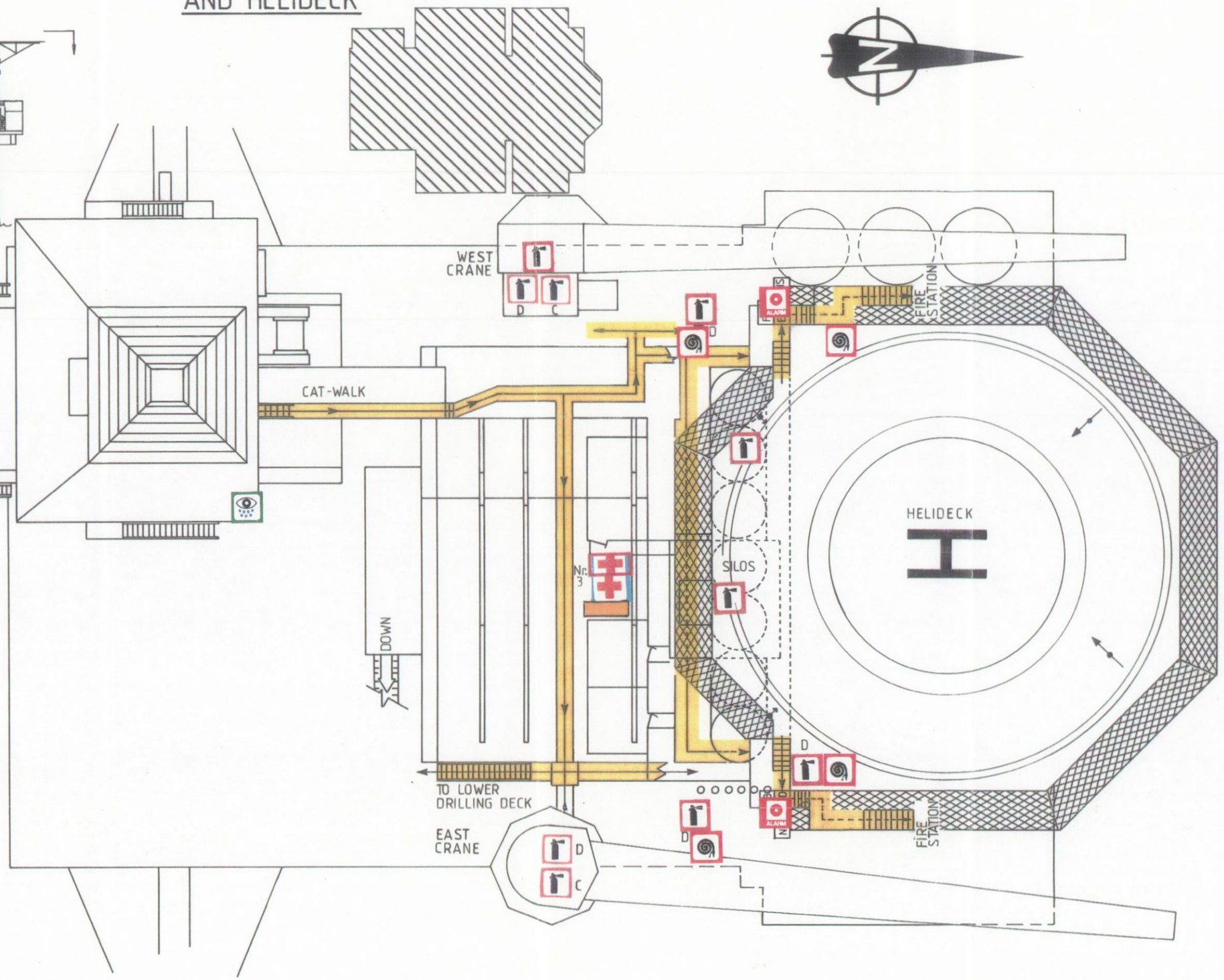
ISSUE 2. MARCH 93

SAFETY PLOTPLAN & ESCAPE ROUTES

CAD FILE: 93-024.DGN

DP 2 UPPER DRILLING DECK AND HELIDECK

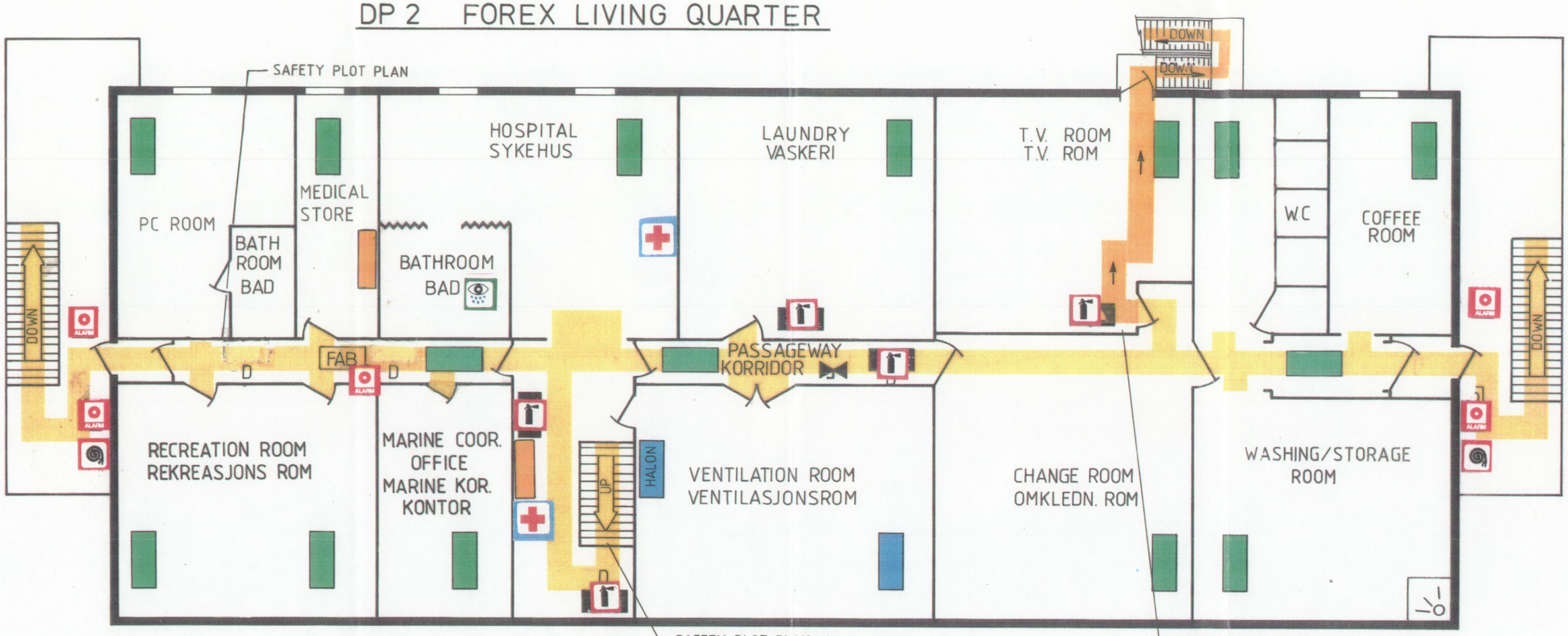

KEY VIEW

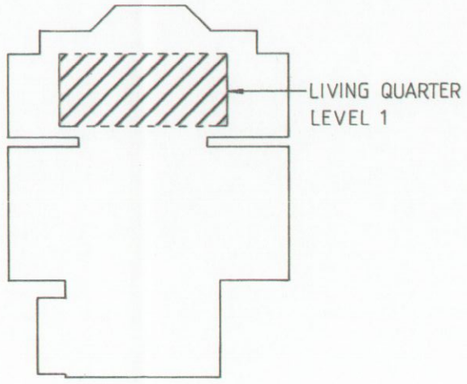


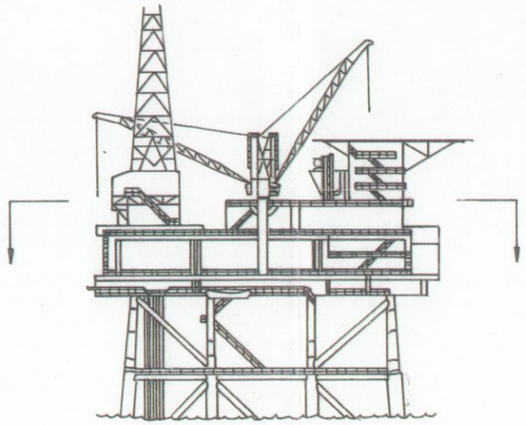
ISSUE 2, SEP.1992

SAFETY PLOTPLAN & ESCAPE ROUTES Helideck & Upper Drilling Deck	10.13.1

DP 2 FOREX LIVING QUARTER





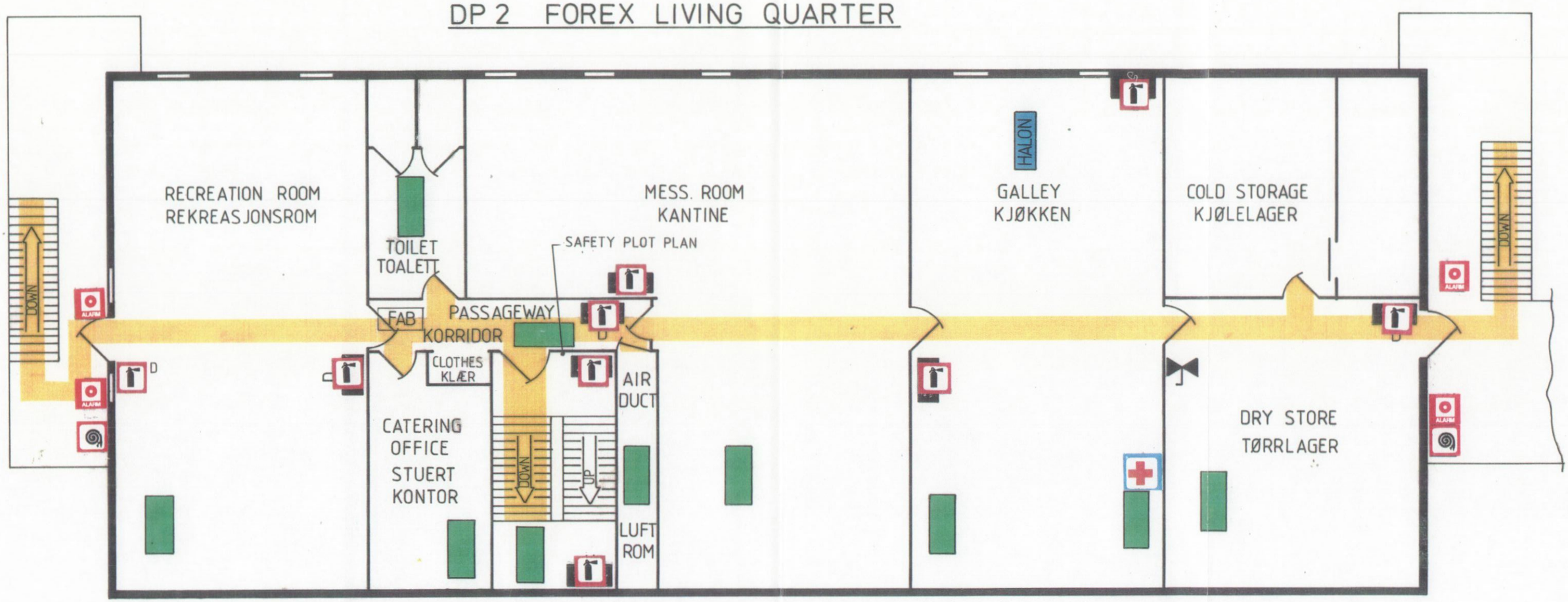


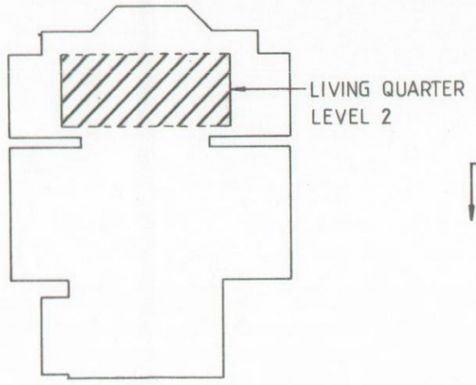
KEY VIEW

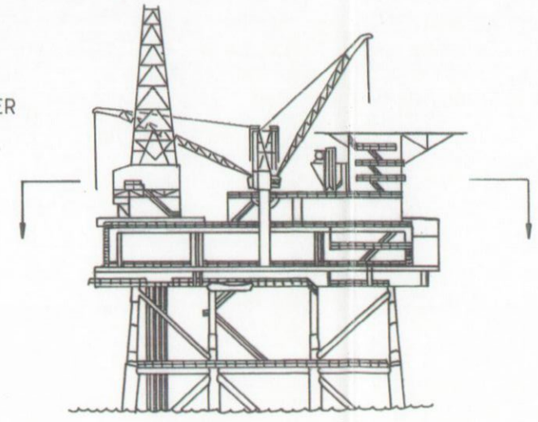
ISSUE 3, SEP.1992

SAFETY PLOTPLAN & ESCAPE ROUTES Living Quarters-Level 1	10.13.2.

DP 2 FOREX LIVING QUARTER





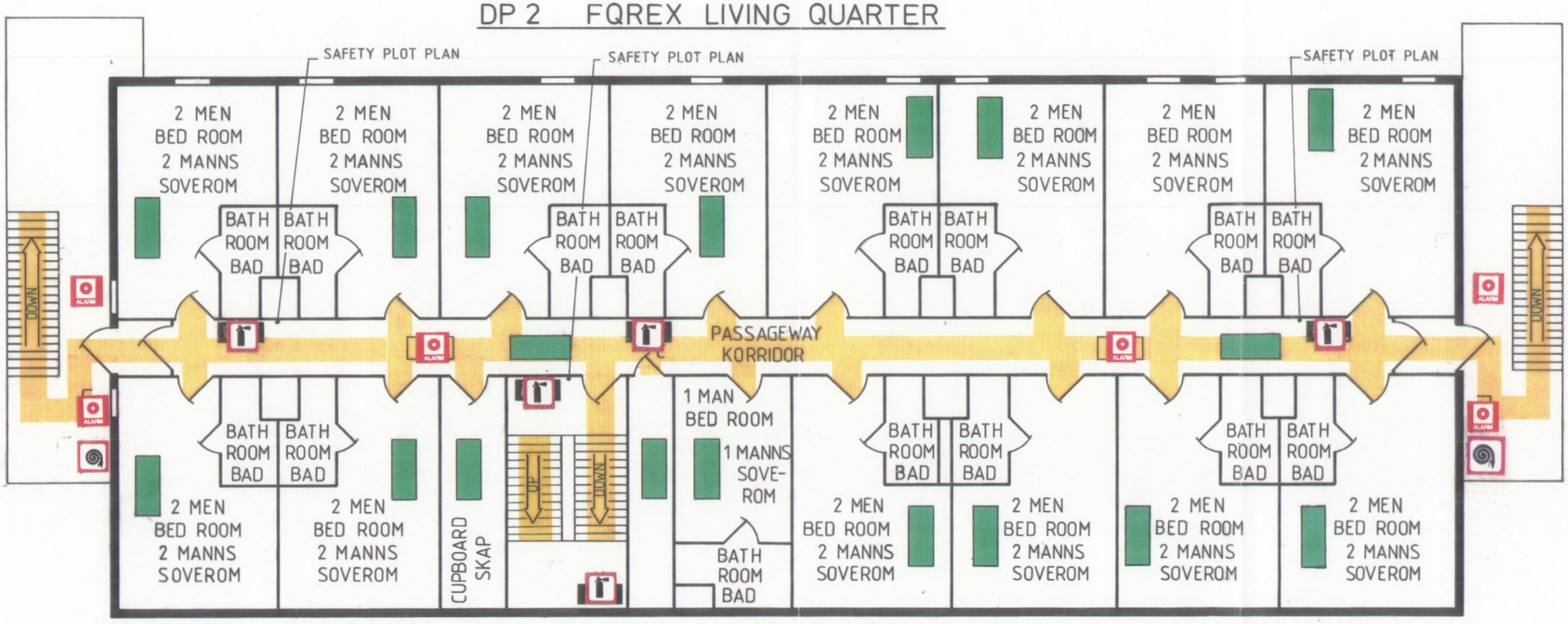


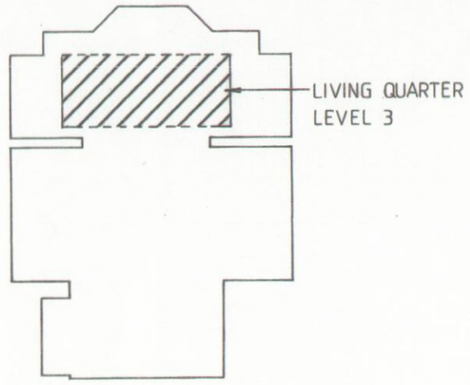
KEY VIEW

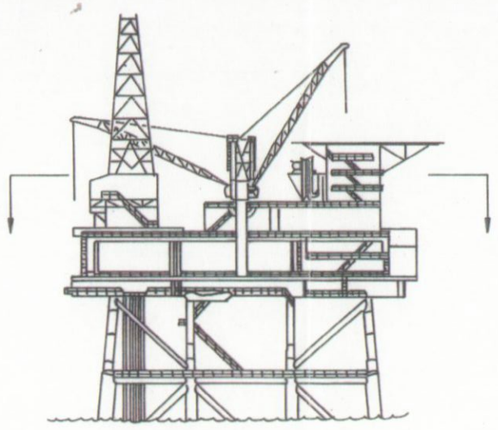
ISSUE 2, SEP. 1992

SAFETY PLOTPLAN & ESCAPE ROUTES Living Quarters-Level 2	10.13.3

DP 2 FQREX LIVING QUARTER







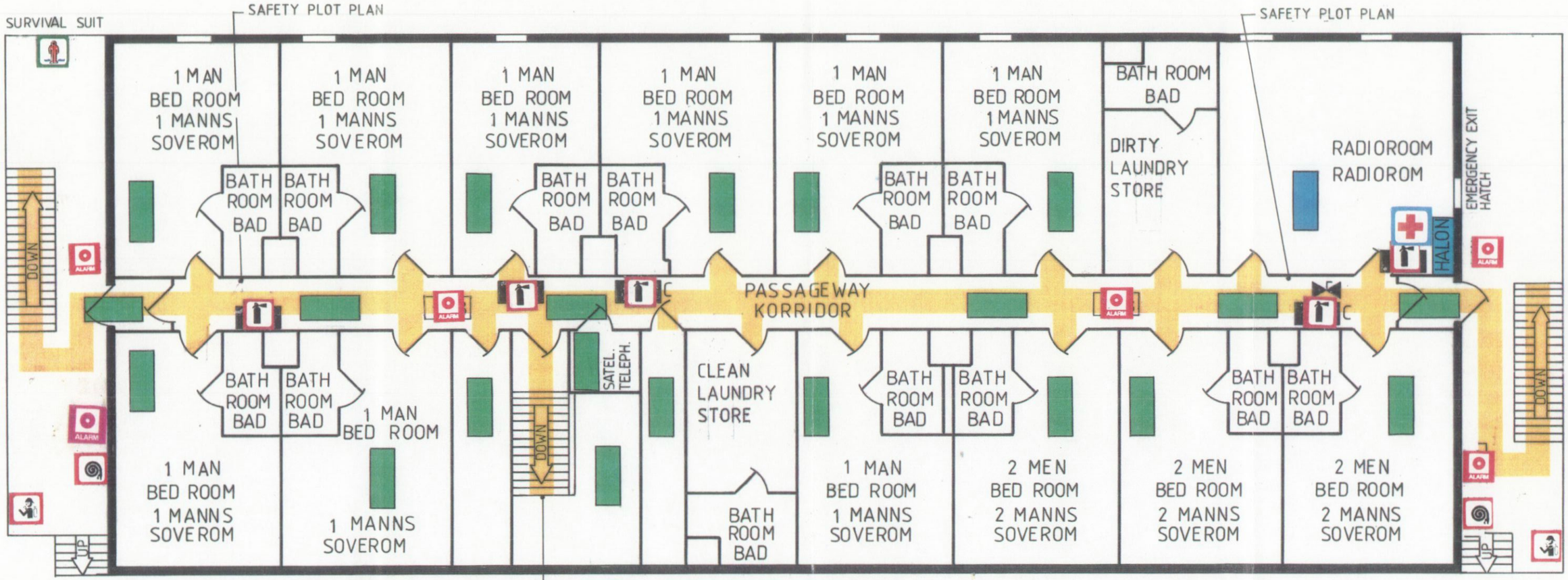
KEY VIEW

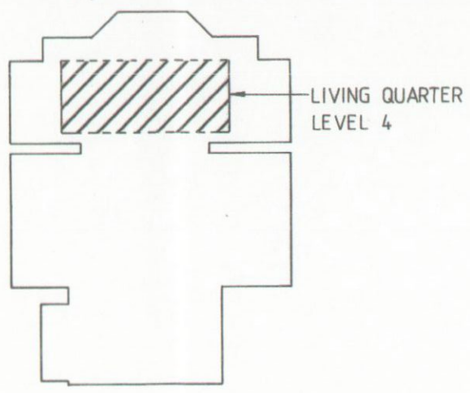
NOTE: THE CABINS ARE MOTHBALLED.
AND NOT IN USE.
THE CORRIDOR, ACCESS AND EXITS
STILL IN USE.

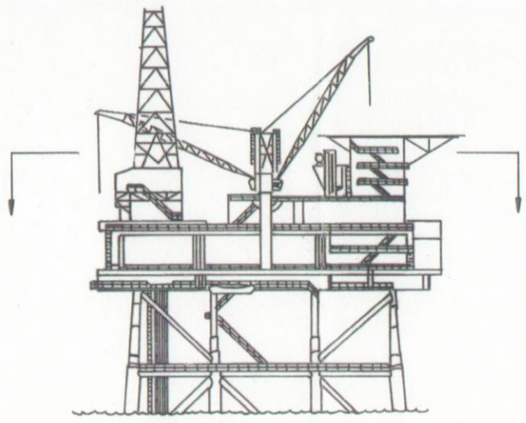
ISSUE 3, SEP.1992

SAFETY PLOTPLAN & ESCAPE ROUTES Living Quarters-Level 3	10.13.4

DP 2 FOREX LIVING QUARTER







KEY VIEW

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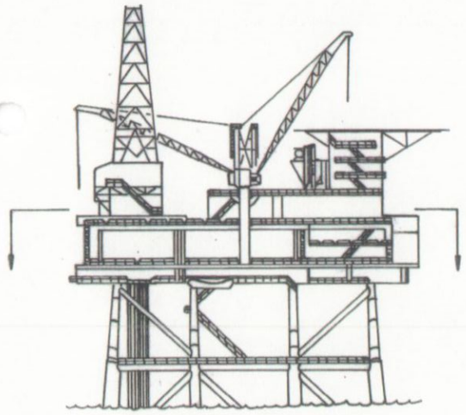
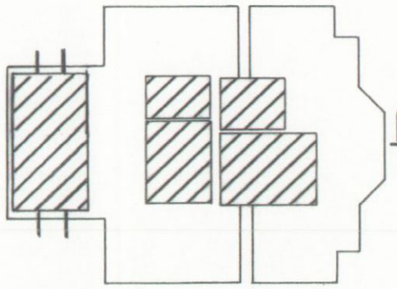
SAFETY PLOTPLAN & ESCAPE ROUTES Living Quarters-Level 4	10.13.5

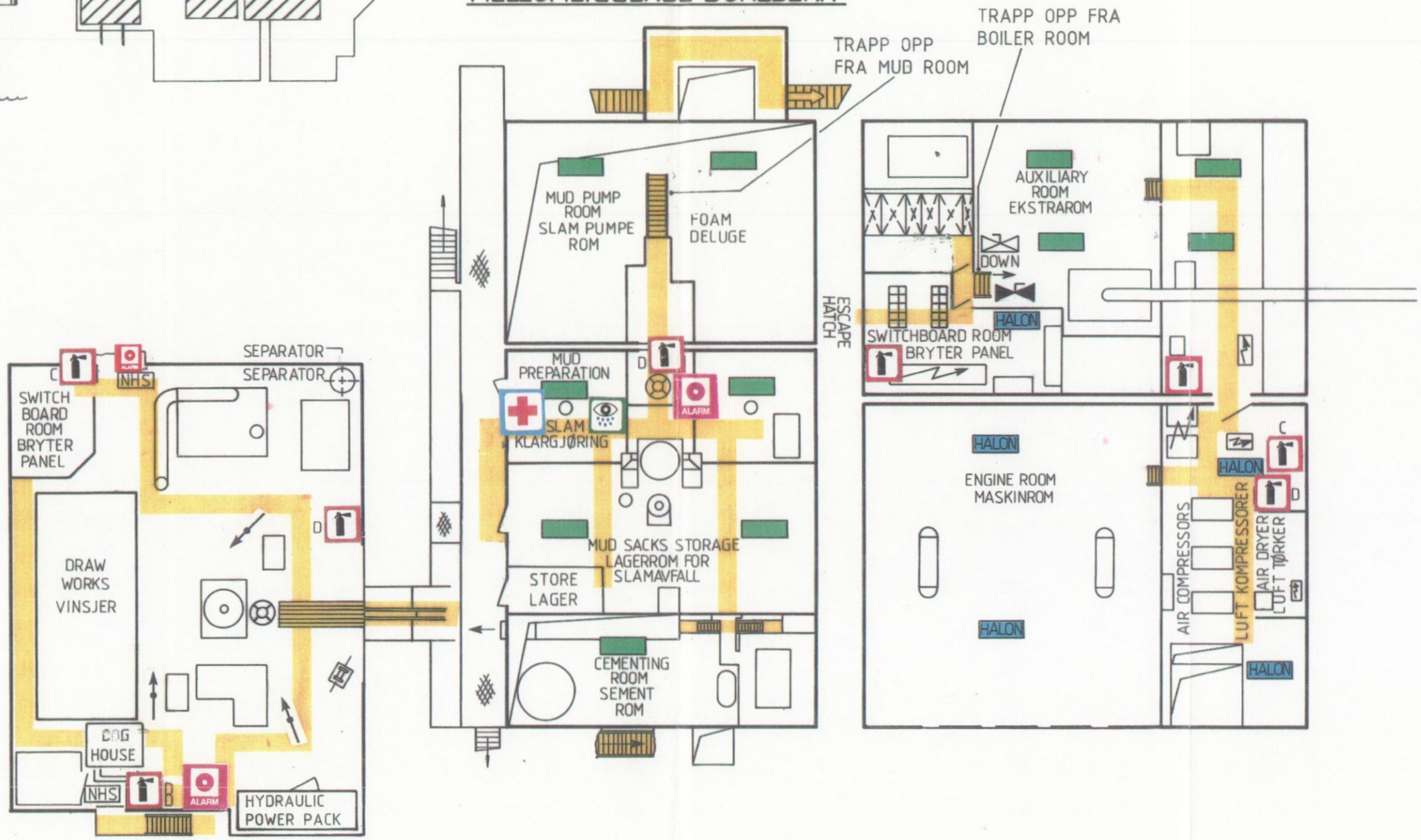


KEY VIEW



DP 2 INTERMEDIATE DRILLING DECK
MELLOMLIGGENDE BOREDEKK

PLATFORM NORTH N



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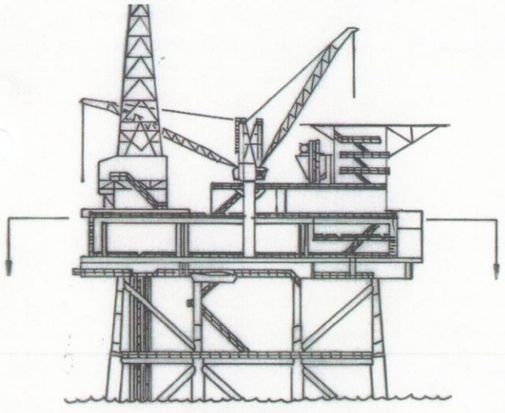
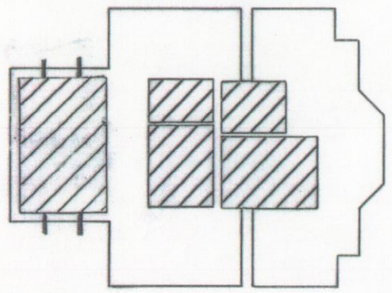
SAFETY PLOTPLAN & ESCAPE ROUTES Intermediate Drilling Deck	10.13.6.



KEY VIEW



DP 2

LOWER DRILLING DECK
NEDRE BOREDEKK

SEA WATER TANK SJØVANNSTANK

FUEL TANK 110m³ OLJETANK

FUEL TANK 110m³ OLJETANK

DOWN

DOWN

MUD PUMP ROOM SLAM PUMPEROM

HALON

SEAWATER TANK SJØVANNS TANK

AUXILIARY ROOM

EKSTRAROM

WAREHOUSE LAGER

Nr.2

INDUSTRIAL WATER TANK INDUST. VANN-TANK

MECH. WORKSH. MEK VERKSTED

WORKSHOP VERKSTED

SS

ELEC. WAREH. ELEK. LAGER

L.Q. LIMIT B-K OMRÅDE

UP

LIFEBOAT NO.3

BOP ACCUMULATOR UNIT
B.O.P. AKKUMULATOR OMRÅDE

SHALE SHAKERS
RENSEANORDN. FOR BORESLAM

NHS

DEGASSER

MUD DITCH

SLAM GRØFT

DESANDER TANKS
SANDUTSKILLER TANK

SWITCHBOARDS
BRYTER PANEL

MUD TANK SLAM TANK

MUD TANK SLAM TANK

MUD TANK SLAM TANK

MUD TANK SLAM TANK

SWITCHBOARD

BRYTER PANEL

SWITCHBOARDS
BRYTER PANEL

ENGINE ROOM MASKINROM

FORGRENINGSRØR MED MEKANISME FOR TRYKK-KONTROLL

CHOKEMANIFOLD

FOAM UNIT

CEMENTING ROOM SEMENTROM

ALARM

SURVIVAL SUIT

DOWN

N

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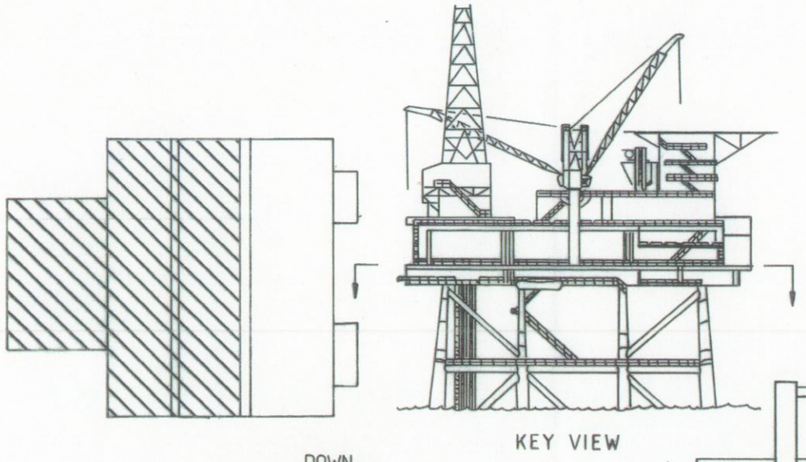
SAFETY PLOTPLAN & ESCAPE ROUTES
Lower Drilling Deck

10.13.7

DP 2 PRODUCTION DECK
PRODUKSJONS DEKK



MODULE 1

MODULE 2

MODULE 3

PICK-UP BOAT
REDNINGSBÅT

ESCAPEWAY TO SEALEVEL
NØDUTGANG TIL HAVNIVÅ

BACT./INHIBITOR SYSTEM

SURVIVAL
SUIT

ESCAPEWAY TO SEALEVEL
NØDUTGANG TIL HAVNIVÅ

WH-B
2nd LEV.

WH-A
2nd LEV.

UP
DOWN
ALARM

N

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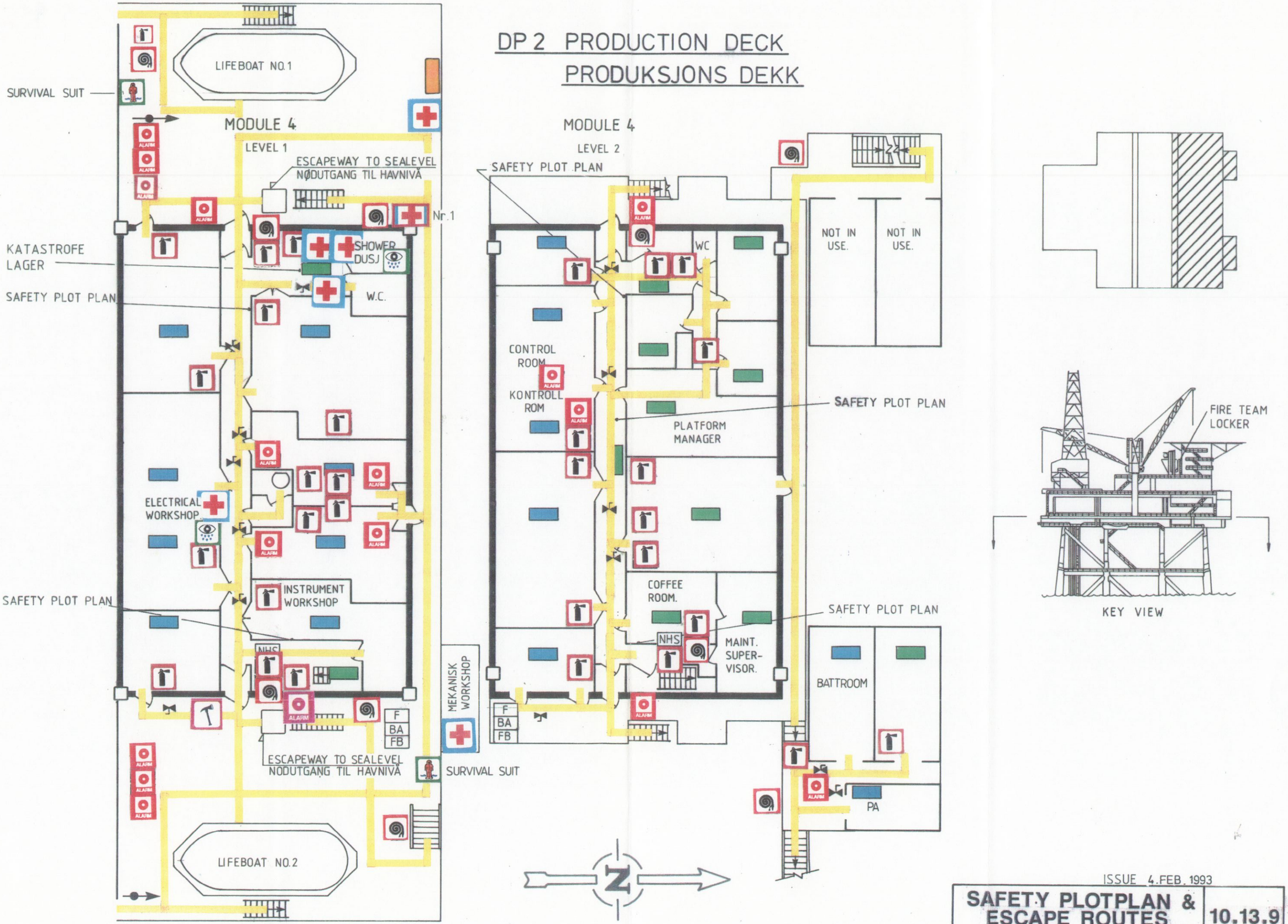
SAFETY PLOTPLAN & ESCAPE ROUTES
Production Deck – Mods. 1, 2 & 3

10.13.8

DP 2 PRODUCTION DECK
PRODUKSJONS DEKK



KEY VIEW

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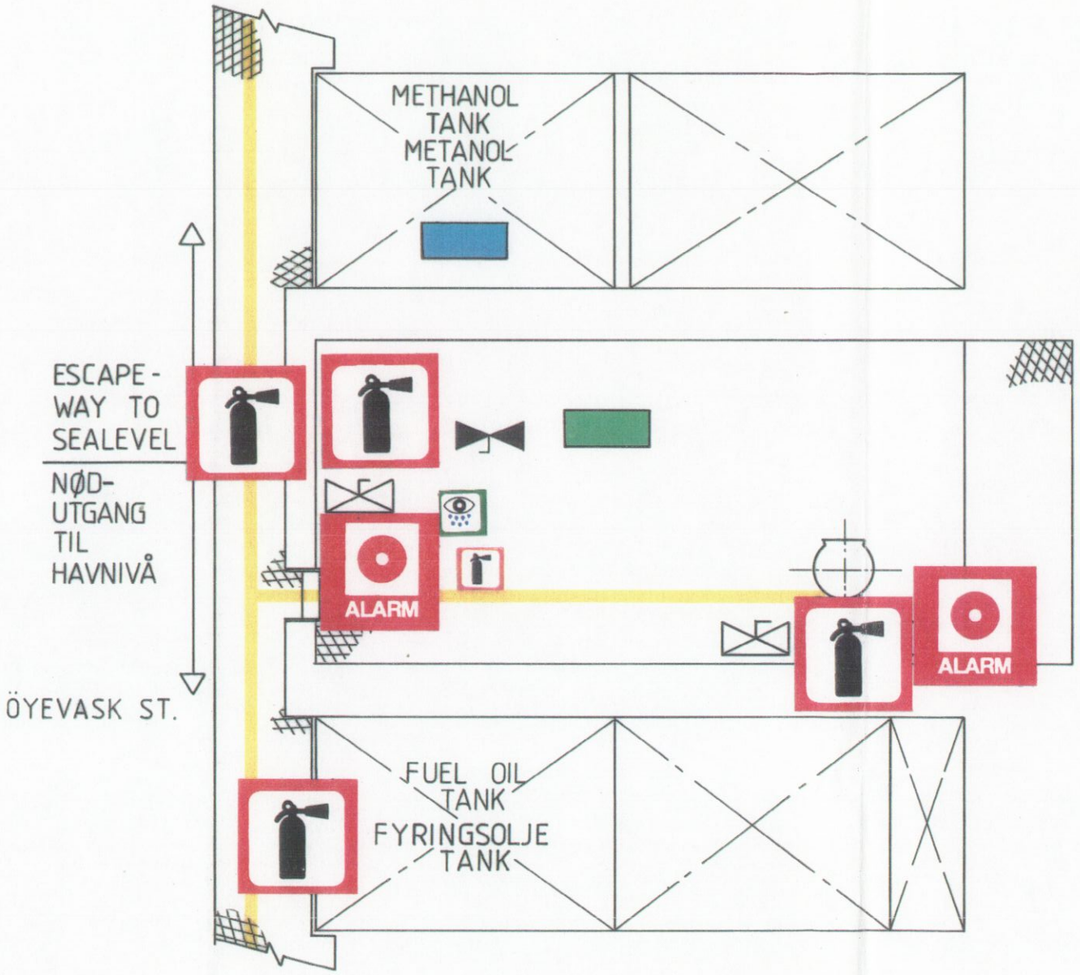
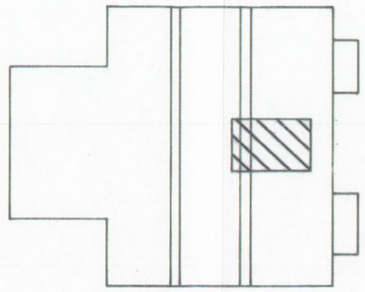
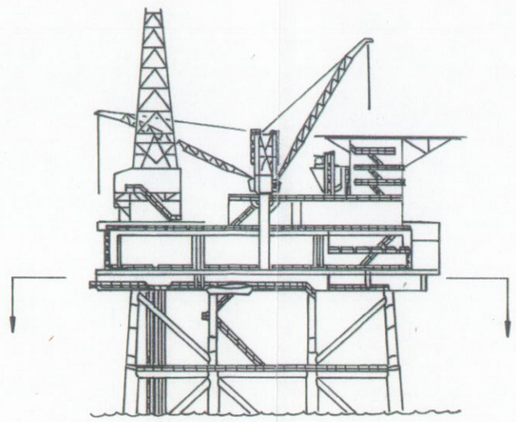
SAFETY PLOTPLAN & ESCAPE ROUTES Production Deck-Mod.4	10.13.9

DP 2 PRODUCTION DECK
PRODUKSJONS DEKK

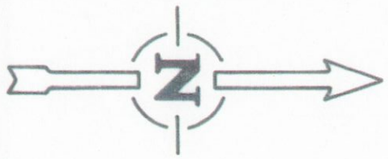
PUMPHOUS - PUMPEHUS







KEY VIEW



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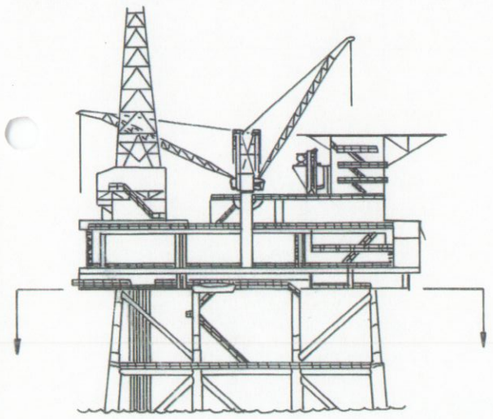
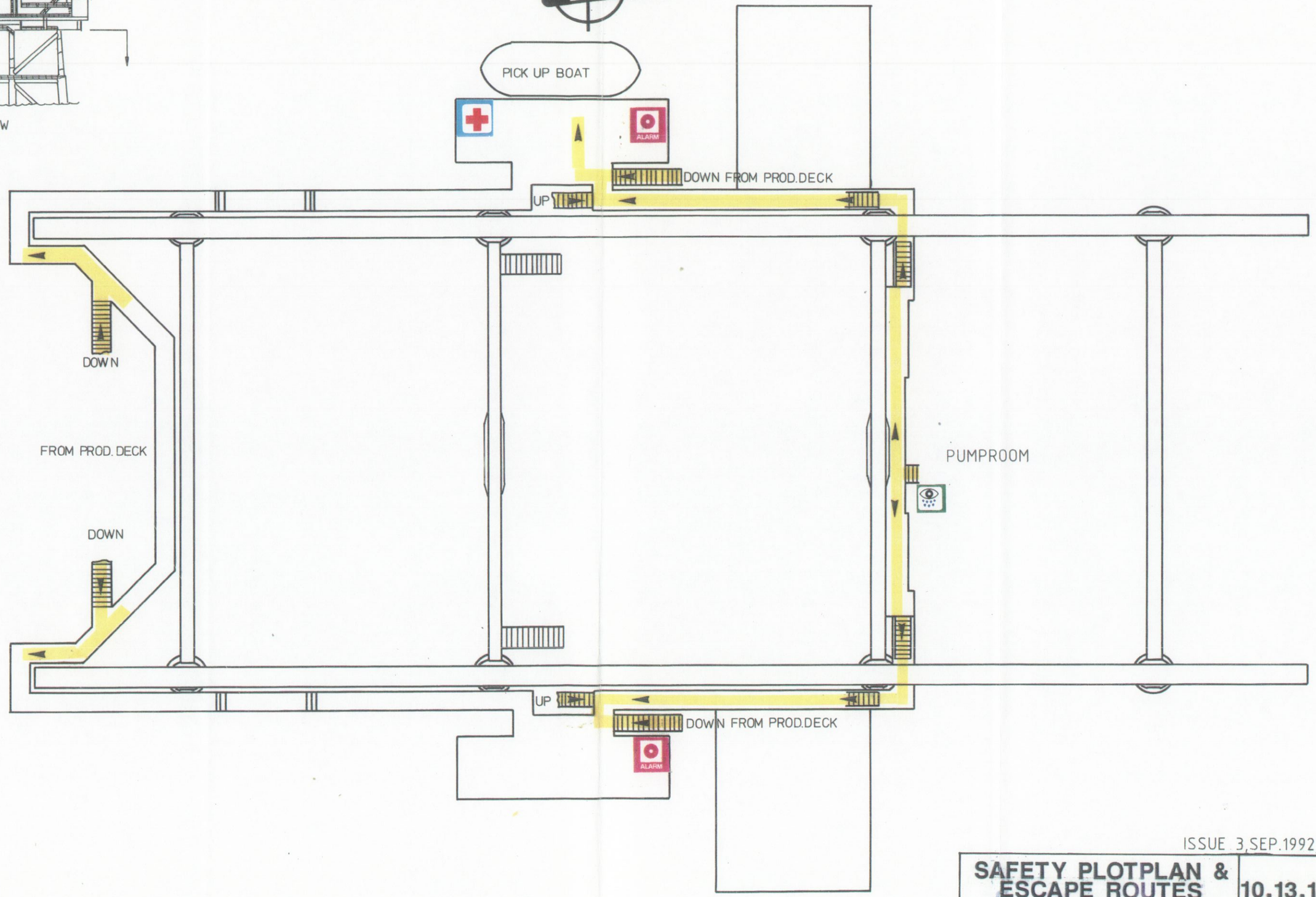
SAFETY PLOTPLAN & ESCAPE ROUTES Pumphouse	10.13.10



KEY VIEW

DP 2 DECK SUPPORT FRAME



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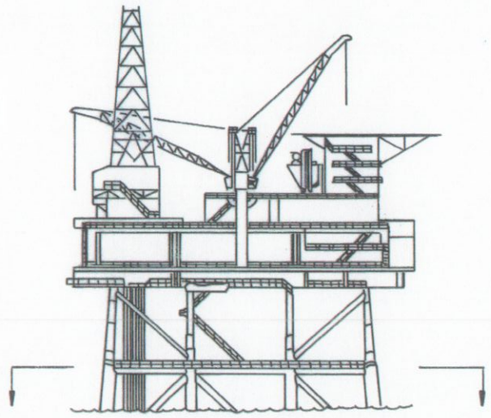
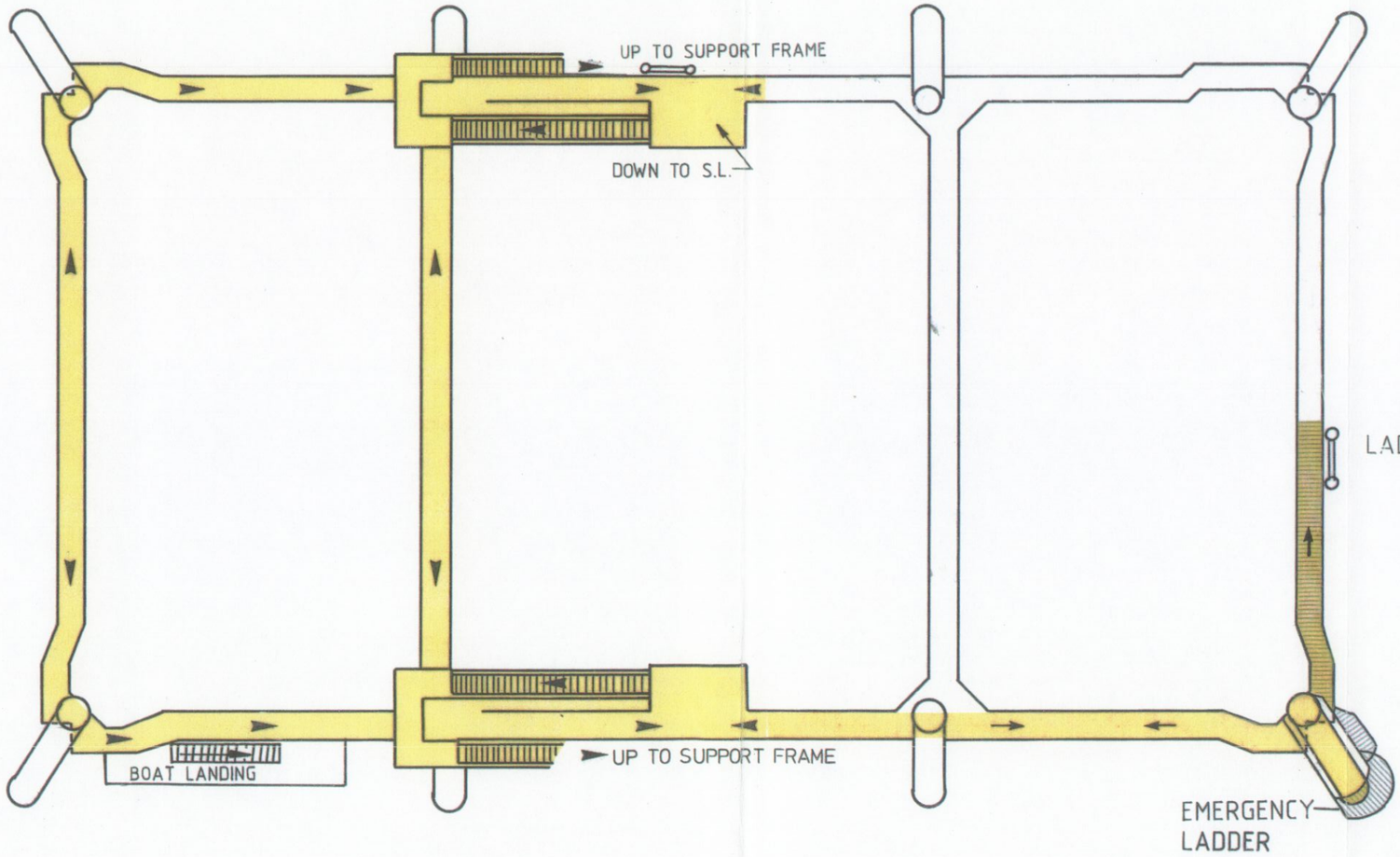
SAFETY PLOTPLAN & ESCAPE ROUTES Deck Support Frame	10.13.11



KEY VIEW

DP 2 TOP OF JACKET



ISSUE 3,SEP.1992

SAFETY PLOTPLAN & ESCAPE ROUTES Top of Jacket	10.13.12

EMERGENCY LIGHTING

1. GENERAL

1.1 For the purposes of this section 'emergency lighting' is considered to be lighting that is battery maintained and remains in operation for a limited period when the 5.5kV normal input via submarine cable from TCP2 has failed.

1.2 Such lighting is of two types, as follows:

(a) Lighting fittings supplied at 48V dc from the platform central dc supply.

(b) Normal 220V ac, twin tube, 2 x 40W, cold cathode, fluorescent luminaires with rechargeable batteries and changeover facilities.

1.3 Note that all the above fittings are in use during normal operation as well as during generated supply failures. In case (a) however, under these conditions the fittings are supplied with power direct from the rectifiers in the chargers, the batteries merely floating and not contributing to the lighting load.

2. DESCRIPTION

2.1 Distribution

2.1.1 The 48V dc fittings are fed, through selector switches, from either Battery A or Battery B of the platform central dc supply which is described in section 6.4. The illustration shows the whereabouts and type of all such fittings.

2.1.2 Each of the four emergency lighting circuits is fed via a timing cut off contactor. When the normal power input fails, the batteries take over the lighting load without interruption; also the contactors begin a timing sequence which is aimed at disconnecting less essential lighting in a logical sequence to save power. The illustration shows the cut off times, with the locations and types of lighting fitting concerned.

2.1.3 The 220V ac battery supported fluorescent luminaires comprise about 50 percent of all 220V ac fittings, both internal and external. They are fed from lighting distribution boards LL01, LL02 and LL03 as described in section 6.14.

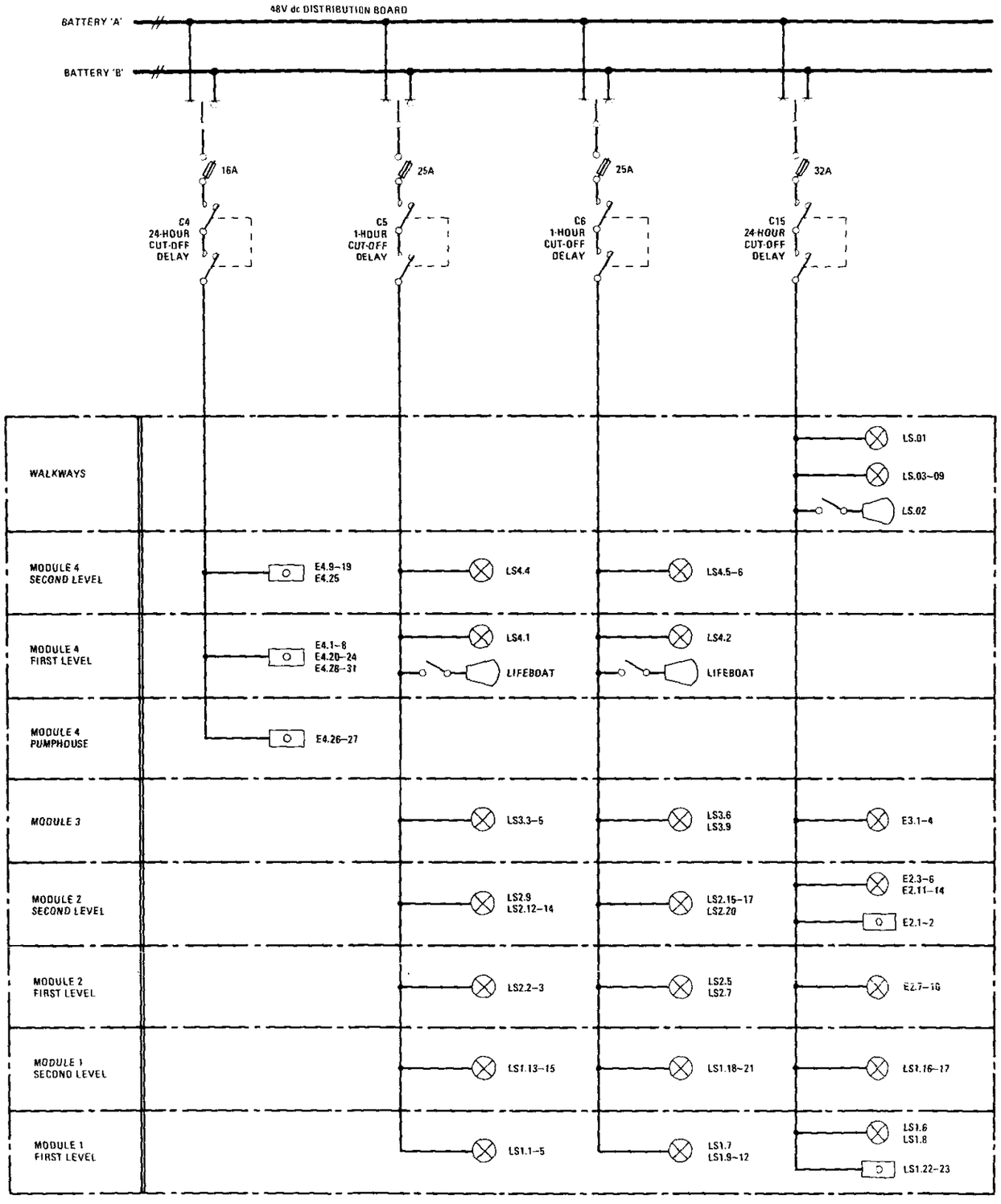
2.2 Lighting Fittings

2.2.1 All 48V dc emergency lighting fittings are of the incandescent type in explosion proof fittings. The space lighting and Exit signs have 40W lamps. The floodlights at Lifeboat Stations and walkway are rated at 300W. The lifeboat floodlights are fed from a 1 hour circuit and are automatically switched off after that time. The walkway's floodlight is fed from a 24 hour circuit but has a local 1 hour timer. It must be switched on when required (ie it does not come on automatically upon mains failure) and will then burn for one hour, unless manually switched off, before being switched off by its local timer.

2.2.2 The 220V ac battery supported fluorescent fittings are similar to standard fittings, but have a rechargeable, tubular 6V battery mounted on the top, together with a transformer/rectifier charger, an undervoltage relay, an inverter and a transformer.

2.2.3 During normal operation the charger provides a trickle charge for the battery and both tubes are fed direct from the 220V ac supply. When this fails the undervoltage relay connects the battery to the inverter, whose output is fed to the transformer and thence at 220V to one tube only. This arrangement provides emergency lighting at half the normal level for about 90 minutes.

2.2.4 Upon re-appearance of the normal supply the circuit returns to normal and the battery is recharged. The recharge is slow, no boost rate being provided, and can take up to 24 hours after a deep discharge.



KEY	
⊗	40W EMERGENCY LIGHT
⬭	300W EMERGENCY FLOODLIGHT
▭	EMERGENCY EXIT LIGHT

LIFESAVING EQUIPMENT

1. GENERAL

1.1 The following lifesaving equipment is provided for the evacuation of personnel from the platform:

(a) Two 42-man lifeboats
(b) Two 20-man liferafts

1.2 Eight lifebuoy stations are provided around the Production Deck.

1.3 The location of Lifesaving Equipment is shown on the diagrams in Section 10.13.

2. LIFEBOATS

2.1 General

2.1.1 Each fibreglass Schat Watercraft lifeboat is powered by a 22kW Lister HRW2 water cooled diesel engine. The engines are equipped with Bryce Berger hydraulic starting systems and Borg Warner hydraulic transmissions.

2.1.2 The lifeboat system is designed to enable the crew to evacuate the platform quickly. The lifeboat itself is totally enclosed and independent of the outside atmosphere, and protected by a water spray system which enables the lifeboat to survive an oil fire for 10 minutes (about 1.6km width) when proceeding at maximum speed.

2.1.3 The water spray system consists of a 16 000 litre compressed air cylinder charged to 248.3 bar, driving a Watercraft CP10 pump which draws sea water through the bottom of the boat and discharges it through a filter to the spray nozzles.

2.1.4 The air exhausted from the water spray system pump is sufficient to supply the engine when running at full throttle, to provide air for personnel, and to maintain a slight pressure in the passenger space for the exclusion of toxic fumes.

2.1.5 The lifeboat carries sufficient fuel for 24 hours' operation, and is also provided with the following emergency equipment, stowed in the steering console locker:

(a) Pyrotechnic signals.

(b) Portable radio-telephone for emergency frequency only: battery operated and providing 2-way voice communications, plus a 2-tone alarm transmission which actuates alarm systems in ships and coastguard stations.

(c) A flashing beacon with line: battery operated and normally hung upside down. When inverted, the beacon automatically switches on and will operate while floating in water.

(d) VHF beacon buoy for air/sea rescue. Release of the flexible antenna switches on the beacon, which continues to operate for 48 hours.

(e) Hand torch, battery operated.

(f) Portable radar reflector.

2.1.6 The boat has two watertight doors on each side for embarkation, and is attached to the two sets of falls by Mills release gear, operated by the helmsman by means of a handle mounted on the port side of the steering platforms. The gear is designed so that it will not release until the boat is waterborne.

2.1.7 The Schat Type ORD/DHM davits allow the boat to be lowered without power at a controlled speed of 18 to 36m/min.

2.1.8 Lowering is controlled by the helmsman by means of a wire which passes through the canopy at the control position. Lowering ceases at any position on release of the control wire.

2.1.9 Hoisting is normally by electric motor, but may also be carried out by hand crank, which does not revolve when the hoist motor is running or when the boat is being lowered by gravity.

2.2 Operation

2.2.1 To Lower the Lifeboat

(1) Check that the winch brake is fully on.

(2) Release the gripes by opening the quick release slip hooks, and allow the weight of the boat to be taken by the falls. Check that the Mills quick release gear wire is not fouling the superstructure.

(3) Embark personnel and secure the hatches; check that the ventilator installed in the top of the cover is open.

(4) The person designated as helmsman will start the engine as follows:

(a) Check that the fuel tank outlet valves are open.

(b) Depress and hold the throttle control pushbutton (to disengage the transmission) and push the throttle lever to the Full Ahead position.

(c) Check that the decompression levers are facing forward.

(d) In cold weather, lift the Overload Stop (painted yellow).

(e) Take up the slack on the hydraulic start lever, then firmly pull the lever through its full travel.

(f) Return the start lever to its original position.

(g) When the engine fires, move the throttle lever to the Neutral position. The lever engages the hydraulic transmission when operated.

(5) Pull the control wire to lower the boat.

(6) When the boat is waterborne and the weight is off the falls, pull the quick release handle to disengage the Mills release gear.

(7) Close the ventilator.

(8) Move the throttle lever to the required Ahead position and steer the boat away from the platform.

(9) If required, operate the water spray system by opening the valve (painted red) under the forward centre seat.

2.2.2 To Hoist The Lifeboat

(1) At the davit, check that the winch brake is fully on.

(2) Check that the function of the 'overhoist' and 'stowed position' limit switches by manually operating the levers.

(3) Position the lifeboat under the falls, and engage the Mills release gear.

(4) Stop the engine.

(5) Close the main circuit breaker at the davit.

(6) Operate the winch motor and hoist the lifeboat. Check that the control wire is coiling correctly.

(7) When the lifeboat is 6in from the stowed position, stop the winch motor.

(8) Open the main circuit breaker and complete stowage of the boat by hand crank.

(9) Secure the gripes.

(10) When the boat is secure, release the brake to take the weight on the falls, then re-apply the winch brake.

3. LIFERAFTS

3.1 General

3.1.1 Two 20-man inflatable liferafts are provided at stations on the east and west sides of the Production Deck.

3.1.2 The liferafts are davit launched with a full complement of men on board, plus provisions, search detection equipment, first aid kit, etc.

3.1.3 Each liferaft comprises two superimposed buoyancy tubes, a double skin floor and a canopy. The buoyancy tubes are inflated automatically by a CO_2 cylinder located under the raft which is discharged during the launch sequence. Inflation of the raft also erects the canopy.

3.1.4 Water pockets under the liferaft provide stability, and a drogue may be streamed to limit drift and provide directional stability.

3.2 *Liferaft Launching*

(1) Place the liferaft valise on deck below the davit.

(2) Secure the raft bowsing lines to the deck cleats.

(3) At the davit, attach the release hook to the ring on the liferaft.

(4) Place the crank handle in position and traverse the davit to the outboard position.

(5) Pull the painter to inflate the liferaft.

(6) When the raft is fully inflated, boarding may commence.

Note: Personnel must remove shoes and sharp objects before boarding the liferaft.

(7) When the raft is loaded, release the bowsing lines.

(8) Lift the brake lever and allow the raft to descend under control of the winch centrifugal brakes. The brake can also be released from within the raft by pulling the brake release line; this pulls the brake lever over centre.

(9) During the descent pull the hook trip wire and cock the hook release mechanism. When the raft reaches the water it will be released automatically.

(10) Paddle away from the platform.

(11) In cold conditions, inflate the floor. Remove the bung from the valve in the floor and inflate using the hand bellows.

(12) Adjust the doorway to suit the weather conditions, but ensure adequate ventilation at all times. Yawning and lack of energy indicate the need for fresh air.

(13) If required to be towed, the towline must be attached only to the liferaft painter bridle or painter attachment patch.

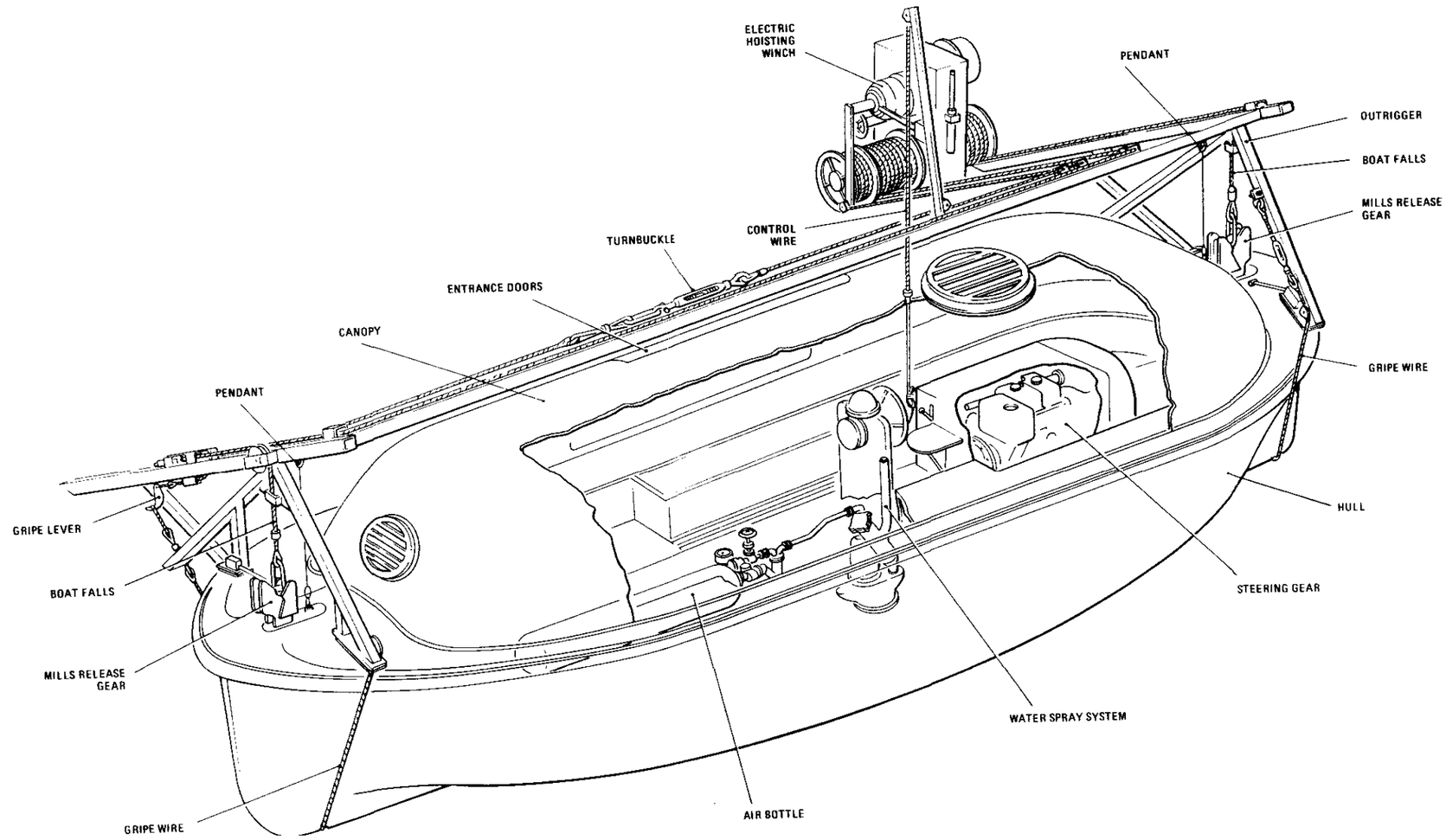
(14) Rescue survivors either by throwing the rescue line and quoit or pass the quoit over one arm and swim to the survivor. Unconscious survivors must be lifted under the armpits and slid gently backwards into the raft.

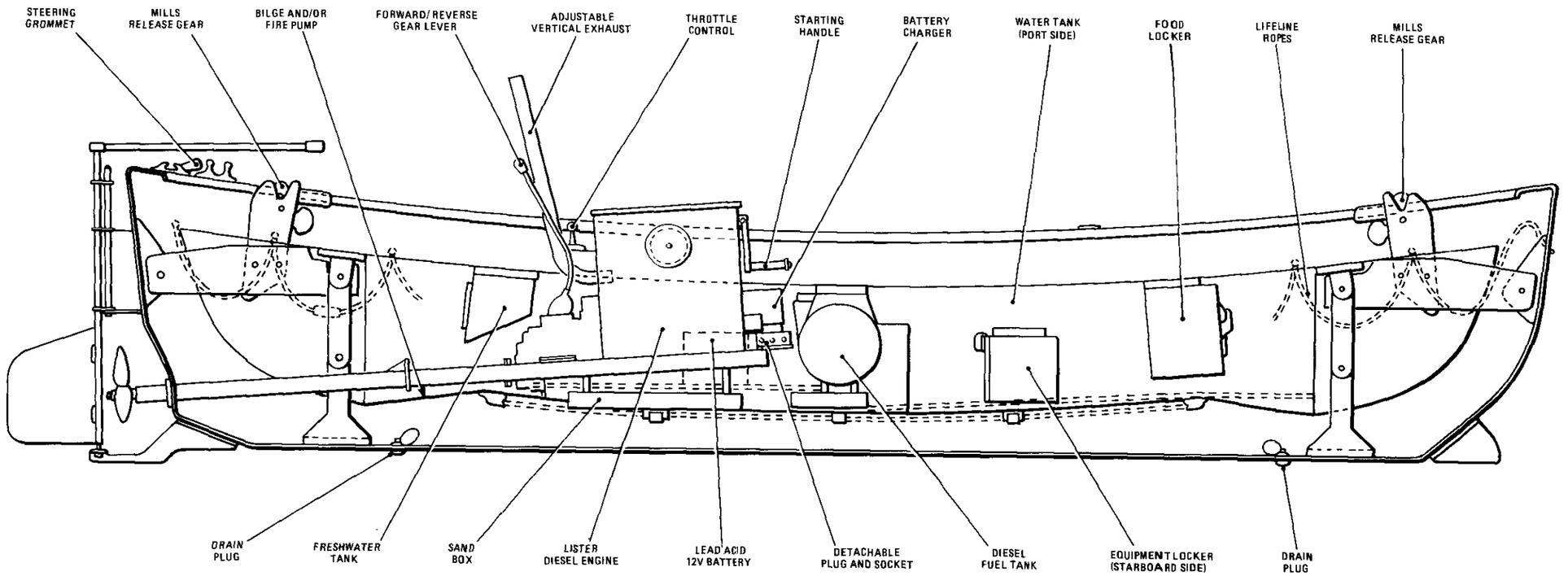
4. LIFEBUOYS

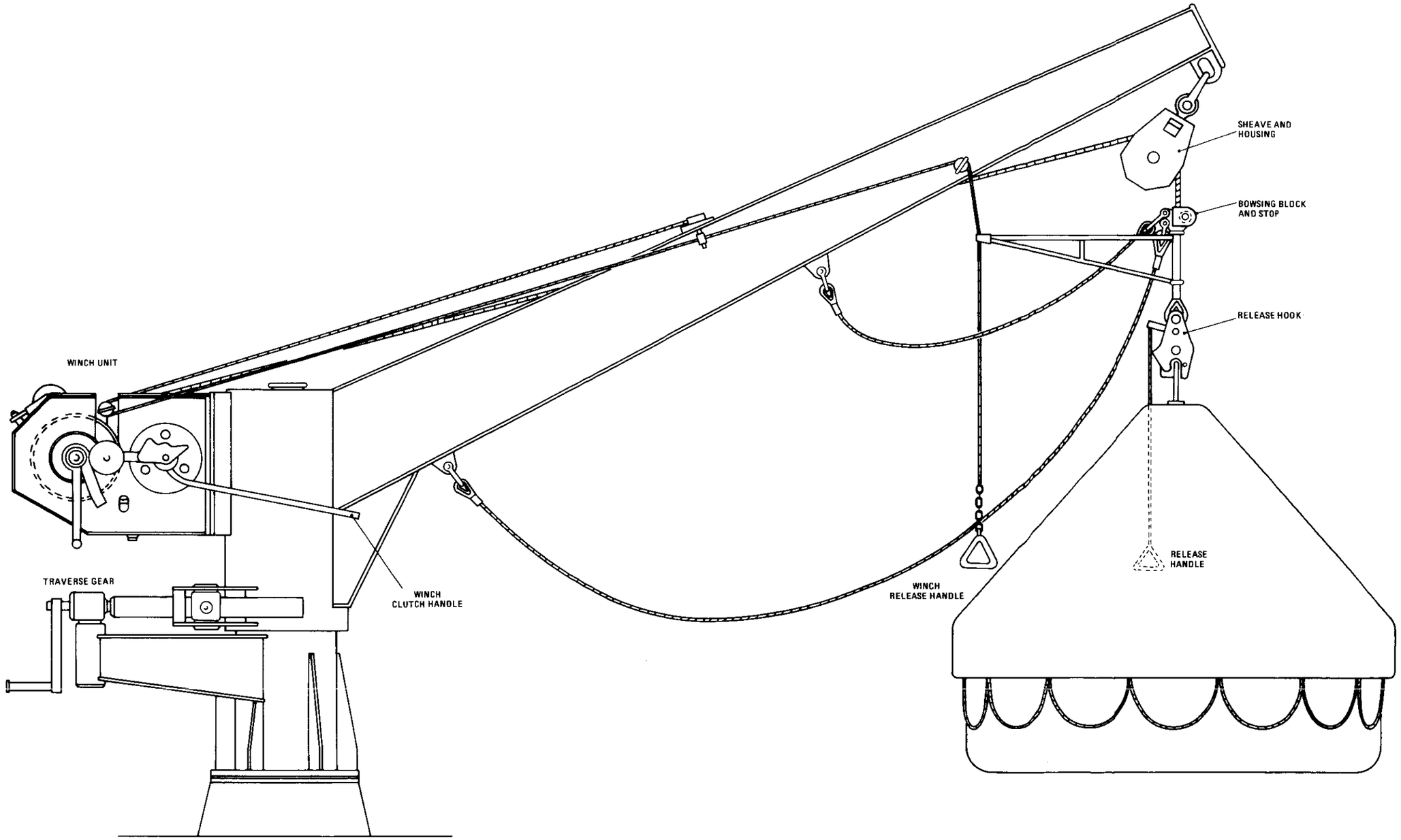
4.1 Each lifebuoy is equipped with a water activated light which is automatically released when the lifebuoy is thrown overboard.

4.2 Once activated the light will illuminate for 45 minutes.

4.3 A lightweight throwing line 50m long is attached to each lifebuoy.


ELECTRIC HOISTING WINCH
PENDANT
OUTRIGGER
BOAT FALLS
MILLS RELEASE GEAR
CONTROL WIRE
TURNBUCKLE
ENTRANCE DOORS
CANOPY
GRIPE WIRE
PENDANT
HULL
GRIPE LEVER
BOAT FALLS
STEERING GEAR
MILLS RELEASE GEAR
WATER SPRAY SYSTEM
GRIPE WIRE
AIR BOTTLE


STEERING GROMMET
MILLS RELEASE GEAR
BILGE AND/OR FIRE PUMP
FORWARD/REVERSE GEAR LEVER
ADJUSTABLE VERTICAL EXHAUST
THROTTLE CONTROL
STARTING HANDLE
BATTERY CHARGER
WATER TANK (PORT SIDE)
FOOD LOCKER
LIFELINE ROPES
MILLS RELEASE GEAR
DRAIN PLUG
FRESHWATER TANK
SAND BOX
LISTER DIESEL ENGINE
LEAD ACID 12V BATTERY
DETACHABLE PLUG AND SOCKET
DIESEL FUEL TANK
EQUIPMENT LOCKER (STARBOARD SIDE)
DRAIN PLUG


SHEAVE AND HOUSING
BOWSING BLOCK AND STOP
RELEASE HOOK
WINCH UNIT
TRAVERSE GEAR
WINCH CLUTCH HANDLE
WINCH RELEASE HANDLE
RELEASE HANDLE