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1. GENERAL



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1. GENERAL

Communications systems on Frigg Central Complex (FCC) are common to the three bridge connected platforms (TCP2, TP1 and QP) which make up the FCC. Nearly all central electronics is located on QP. Equipment on TP1 and TCP2 is thus mainly field type equipment.



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1. RADIO BASED SYSTEMS



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1. RADIO BASED SYSTEMS

The mandatory FCC main radio station for maritime and aeronautical traffic is located on QP.

The following radio communication equipment is located on or in use on TP1:

Lifeboats :

In each lifeboat there is one permanently installed maritime VHF radio powered from the 12V engine start battery, the latter being kept fully charged through a flexible connection which automatically disconnects when the boat is lowered; furthermore one automatic electronic position indicating radio beacon (EPIRB) which automatically starts transmission on 121.5 and 243 MHz when in contact with sea water. It has its own sealed, non-rechargeable battery which must be replaced after use or every three years.

Cranes :

The two TP1 cranes both have permanently installed crane radios (power output limited to 1W) The older MK60 crane has VHF channels only while the newer Molde crane has both VHF and UHF transceivers for hands-free operation (keying knob on crane control handle).

Handportables :

Intrinsically safe VHF and UHF radios are being used by process operators, maintenance personnel, supervisory personnel etc for communicating between themselves, with the control room etc. in accordance with the FCC radio frequencies plan (open channels). Such communication relies on radio contact radio to radio , repeaters are not used.

Permanently installed UHF/VHF radios :

UHF radios are installed in TP1 instrument interface rooms 1 and 2 for use in connection with instrument loop works. A further UHF radio is installed in the TP1 emergency hospital. A VHF radio is installed in the TP1 marine office. The radios are non explosion proof and have external antennas.

Firemen's radios :

The fire team has available special short range radios integrated in their fire men's outfit in order to secure team communication during an intervention . The radios are intrinsically safe(i. s.). The on-site commander has in addition one normal handportable radio for communication with the emergency control team (EMCO).

Radio paging system :

The EMCO team members carry intrinsically safe radio paging receivers. The transmitting equipment is located on QP.



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- 1. PUBLIC ADDRESS AND GENERAL ALARM SYSTEM**



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1. PUBLIC ADDRESS AND GENERAL ALARM SYSTEM

The mandatory PA/GA loudspeakers on TP1 are fed by amplifiers 4-7 in the common FCC PA/GA rack which is located on QP and controlled from the QP central control room. Yellow flashing lights are also fitted. Speech messages are classified as “emergency speech” and “routine speech” respectively with emergency speech taking priority over routine speech. Alarm tones are continuous tone for MUSTER and interrupted tone for GENERAL ALARM. Note that TP1, formerly a gas treatment platform and now a riser platform, is silent i.e. background noise levels do not exceed 83dBA. The lay out of loudspeakers and flashing lights on TP1 is shown on drwgs FF 95 16 06 1198 - 1204. Loudspeakers and flashing lights are explosion proof.



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1. **ELF OFFSHORE TELEPHONE SYSTEM**



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1. ELF OFFSHORE TELEPHONE SYSTEM

A closed numbering automatic telephone network links together the Elf operated platforms TP1, TCP2, DP2 and Frøy. Automatic telephone exchanges are located on QP, TCP2 and DP2. The exchanges are connected via trunks, carried in cable between QP and TCP2(4 trunks) and in microwave link between QP and DP2 (3 trunks). TP1 and Frøy have direct subscriber lines connected to the QP exchange. These subscriber lines are carried in cable between QP and TP1 and in fibre optic cable backed up with a twin channel microwave link between QP and Frøy.

Telephone instruments in process areas are explosion proof and placed in acoustic booths. A common emergency telephone number is displayed in each booth. A dedicated telephone for answering emergency calls is located in QP CCR.

The capacity of the QP exchange is 208 lines, the capacity of the TCP2 and DP2 exchanges is 104 lines each.



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- 1. TOTAL OIL MARINE OFFSHORE TELEPHONE SYSTEM**



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1. TOTAL OIL MARINE OFFSHORE TELEPHONE SYSTEM

Total Oil Marines offshore telephone system is extended to Frigg via Alwyn. A TOM telephone exchange is located on QP. This arrangement allows QP CCR to call in particular Alwyn CCR and St Fergus gas terminal. Calls to the UK public network are also possible as are international calls and in particular to Norway. Elf maintains for Frigg a dedicated UK telephone subscriber number which is being carried to Frigg in TOMs transmission system.

TOM offshore telephone system is not interconnected with Elf telephone system.



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1. **TELEMETRY SYSTEM**



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1. TELEMETRY SYSTEM

Various gas production data and signals are carried between Frigg on the one hand and St Fergus gas terminal and Alwyn CCR on the other hand :

- An overpressure protection signal is derived from the shutdown panel in TP1 instrument interface room no.1. The signal is carried in the Frigg distributed control and data acquisition system (FCDA) to the TOM datacomms cabinet on QP where a data modem connects the signal to Alwyn tropo channel 09 and causes a compressor trip signal to be received on Alwyn.
- A telemetry remote terminal unit (RTU) for leak detection is also located in TP1 instrument interface room no 1. A data modem transmits the signals to QP where they connect to Alwyn tropo channel 05.
- Process telemetry Frigg - StFergus is derived from the Frigg FCDA (MFPS) on QP and transmitted on tropo channel 06 via TOM datacomms cabinet (Bridge/mux - Infotron - Modem).
- Process telemetry Frigg - Alwyn, also derived from FCDA (MFPS) is carried in the same chain (Bridge/mux - Infotron) but separate modem connecting to tropo channel 02.

In addition the StFergus telemetry is on Frigg extended to the QP CCR with two terminal devices :
1 printer (TOPCALL) and one SCADA PC/VDU (Elf HW, TOM SW).

(The previous Frigg local telemetry system of CETT manufacture has been demolished and functions taken over by FCDA system).



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1. SHORE COMMUNICATIONS



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1. SHORE COMMUNICATIONS

Frigg has three independent transmission routes to shore (in addition to maritime coast radio).

Route 1

Main route to Norway. It consists of three segments : 2Mbps radio link between Frigg and Oseberg, Norsk Hydros Microwave system between Oseberg and Bergen, leased line from Bergen to Stavanger.

The following services are carried :

- 5 telephone/fax circuits between QP exchange and Dusavik exchange LAN Frigg - Dusavik
- 2 miscellaneous data circuits
- Direct telephone line for Frostpipe operations
- Third party traffic (Norsk Hydro for Heimdal)

Route 2

Secondary route to Norway. It consists of two segments : Satellite hop Frigg - Eik earth station, leased line Eik - Dusavik.

The following services are carried :

- 3 telephone/fax circuits between exchange and Dusavik exchange
- OFM onshore telephone line
- Direct telephone line Frigg - Sola air control
- Telemetry line for Frostpipe (extended to Sture via leased line)

Route 3

Main route to UK. It consists of three segments : Troposcatter link between Frigg and Alwyn, redundant satellite hop Alwyn - Scotland, onshore leased lines.

The following services are carried :

- Direct telephone line Frigg - Alwyn CCR (tropo ch 01)
- Direct telephone line Frigg - StFergus, access via CCR "Goldstar" comms system (tropo ch 03)
- Elfs UK public telephone line, access via TOM exchange, (tropo ch 04)
- Frigg - Alwyn telemetry, (tropo ch02)
- Frigg - StFergus telemetry, (tropo ch06)
- Leak detection channel, (tropo ch05)
- Over pressure protection, (tropo ch09)
- Third party traffic (Norsk Hydro for Heimdal - Brae operations, voice (tropo ch08),telemetry (tropo ch10)



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- 2. DESCRIPTION**



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1. GENERAL

Navigation equipment installed on platforms QP, TP1 and TCP2 complies with the requirements of the UK Department of Trade (Marine Division) January 1976 'Standard Marking Schedule for Offshore Installations'.

The following navigational aids are installed:

- a) Navigation lights
- b) Obstruction lights
- c) Foghorns
- d) Helideck lights
- e) Identification lights

The navigation lights and main foghorns of all three platforms form two single inter-platform systems. Each system is separately controlled from Platform QP.

The obstruction lights are self-contained systems on each platform.

The identification lights are only on Platform QP:

2. DESCRIPTION

Navigation Lights

Three grouped sets of inter-platform white lights are installed as follows:

- a) One set on the north-east corner of TP1 at Cellar Deck level.
- b) One set on the south-east corner of TPC2 at Cellar Deck level.
- c) One set on the south-west corner of QP at Lower Deck level.

Each set comprises two main white lights and one secondary white light mounted vertically, with the secondary light topmost. Each light is enclosed in a marine lantern fitted with a single-piece fresnel lens.

The main lights are visible in clear weather over a range of 15 nautical miles through 270°. The two have combined nominal luminous intensity of 14 000 candelas.

The secondary light is visible in clear weather over a range of 10 nautical miles through 270°. It has a nominal luminous intensity of 14 000 candelas.

The secondary lantern is equipped with a rotating lampholder containing four lamps. If a lamp fails, the next is automatically rotated into its place. An alarm will indicate in the control room when the last lamp is used.

Subsidiary Lights

Subsidiary red lights are installed on the other three corners of each platform, and at the centre of the interconnecting bridges.



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2. DESCRIPTION (conts.)

Each light is visible in clear weather over a range of three nautical miles through 270° (bridge lights 360°).

Each light is enclosed in a marine lantern fitted with single-piece fresnel lens and a red filter.

Each lantern is equipped with a rotating lampholder containing four lamps. If a lamp fails, the next is automatically rotated into its place. An alarm will indicate in the control room when the last lamp is used.

Obstruction Lights

To warn aircraft of projections above the platform, red obstruction lights are installed on the microwave tower of QP, the cranes of all three platforms, the LT vent stack on TP1 and the LP vent stack on TCP2.

The vertical distance between lights is a nominal 10m.

The LP vent stack CSP24 is also lit by floodlights.

Identification Lights

Three grouped sets of identification lights are installed on the microwave tower on Platform QP, 120° apart at elevation +67.658m, to cover 360°.

Each set comprises three main and three standby white lights, each contained in a stainless steel enclosure.

All lights are visible in clear weather over a range of 22 nautical miles. Each light has a luminous intensity of 200 000 candelas and flashes once every five seconds.

The lights are automatically operated by a photo-cell. A manual On/Off switch is installed to override the system during helicopter take-off and landing.

Power Supplies

All navigational aids except secondary foghorns and obstruction lights receive their power supplies from Platform QP.

Each of the two main white navigation lights on each platform contains one 120V, 500W lamp. Each pair are connected in series and fed through a 220/240V auto-transformer in the base from the HALS 15 control unit supplied from distribution board DB31 on Platform QP.

The secondary white and subsidiary red navigation lights each contain one 12V lamp. The white light's power is 24W and the red light's 6.6W. Power at 120V, 50Hz is fed through a 120/12V transformer in each base from the ILS 750 control unit supplied from the 24V, 100Ah battery supported navigation aids system of Platform QP.



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2. DESCRIPTION (conts.)

The obstruction lights are supplied as follows:

- a) Platform QP - at 220V ac from DB31 (with battery support)
- b) Platform TP1 - at 220V ac from DB8 (no battery support)
- c) Platform TCP2 - at 220V ac from DB308 (no battery support).

Navigational Aids Control

Control unit HALS 15 (in QP) codes and distributes power supplies to the main white navigation lights of QP TP1 and TCP2. Unit ILS 750 (in QP) controls and codes power supplies to the secondary white and subsidiary red navigation lights on these platforms.

Operation of QP, TP1 and TCP2 main white, subsidiary red and obstruction lights is normally controlled by separate sun switches on QP. A manual override switch is located in the QP Radio Room.

In the event of main white navigation light failure, the secondary white light automatically comes into operation, giving an alarm indication in the control room.

All navigation lights on the three platforms are synchronised to transmit the morse letter 'U' every 15 seconds.

Should normal power supplies to the secondary white or subsidiary red navigation lights be interrupted, the lights will automatically continue to function powered by the 24V battery system. This battery has sufficient capacity to maintain the secondary white and subsidiary red lights and main foghorns on all three platforms for a minimum of four (4) days and nights.

A control unit in the battery switch room of platform QP distributes power supplies to the main and standby identification lights. Operation of these lights is normally controlled by a sun switch on QP. A manual override switch is located in the Radio Room for use during helicopter operations. The lights are synchronised to flash at five (5) second intervals.

In the event of main white identification lights failure, the standby lights automatically illuminate, together with alarm indication in the Radio Room.

Foghorns

Main and secondary foghorns are separately mounted and installed in pairs as follows:

- a) At the centre of TP1 north face, Cellar Deck level.
- b) At the centre of TCP2 east face, Cellar Deck level.
- c) At the centre of QP south face, Deck Support level.

Each main foghorn is a vertical array of eight emitters producing a horizontal acoustic beam through 360°, which sounds over a range of two nautical miles in still air.

Each secondary foghorn comprises two emitters producing a horizontal acoustic beam through 360°, which sounds over a range of half a nautical mile in still air.



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2. DESCRIPTION (conts.)

Foghorn Power Supplies

The main foghorns of QP, TP1 and TCP2 operate in parallel at 120V, 50Hz. This supply is provided through control unit SCR 750 (in QP) containing a transformer/rectifier and inverter, with the navigational aids 24V battery system floating across the dc link. The rectifier in this unit acts as a charger for the 24V, 1000Ah navigational aids battery. Power to the control unit is supplied from distribution board DB31 on Platform QP.

The secondary foghorns on the three platforms are supplied independently of each other. All are dc operated and powered from local 12V, 30Ah transformer/rectifiers and batteries. Each is fed from the local emergency (standby) supplies board. The batteries float across the transformer/rectifier outputs. A `float` and `boost` facility is provided. Float is the normal trickle charge condition and Boost is used to recharge the battery. When the battery is fully charged it will revert automatically to Float, indication being given at the charger panel.

Foghorn Panel

The main foghorns on QP, TP1 and TCP2 are manually operated by switch in the QP Radio Room.

Control unit SCR 750 (in QP) controls and codes power supplies to the main foghorns of all three platforms, the common output current being measured by a Horn Current Monitor in QP. Should the output of any main foghorn fall below a preset level, the control unit automatically initiates sounding of the secondary foghorns on all three platforms, and causes an alarm to indicate in QP Control Room.

The secondary foghorns on TP1 and TCP2 are synchronised to the secondary foghorn on QP, which acts as `master`. There is no independent direct switching of the secondary foghorns, they operate from the main foghorn control unit, but only on main foghorn failure.

The main and secondary foghorns are synchronised to sound the morse letter `U` every 30 seconds.

Should normal power supplies to a main foghorn be interrupted, it automatically continues to receive power from the 24V, 1000Ah navigational aids battery system. This battery system has sufficient capacity to maintain the main foghorns on all three platforms (as well as the secondary white and subsidiary red navigation lights) for a minimum of four days and nights.

Should normal power supply to a secondary foghorn be interrupted, its 12V, 30Ah battery automatically takes over. The battery system has sufficient capacity to maintain the foghorn for a minimum of four days and nights.



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2. DESCRIPTION (conts.)

Helideck Lighting

The QP helideck perimeter is marked by 32 flush-mounted, 25W lights, alternately blue and white. They are a nominal 3m apart.

To ensure that loss of any one light will not leave the perimeter unmarked, the lights are fed by six separately switched circuits at 110V ac. Power is supplied from distribution board DB31 via a transformer/rectifier with supporting battery, followed by an inverter. Final distribution is through DB25.

Should the power supply be interrupted the helideck lights are automatically transferred to battery supply.

Operation of the lights is manually controlled by the Helicopter Control Officer.

Two pairs of 500W tungsten-halogen floodlights are installed on the hangar roof to illuminate the helideck. Power is supplied from emergency supply board DB25.